



**FACTORS AND IMPACTS IN THE INFORMATION SOCIETY:  
A PROSPECTIVE ANALYSIS IN THE NEW MEMBER STATES AND  
CANDIDATE COUNTRIES IN THE EU**

**SYNTHESIS REPORT**

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## PREFACE

The Institute for Prospective Technological Studies (IPTS) of the Directorate General Joint Research Centre of the European Commission contracted the International Centre for Economic Growth, European Centre (ICEG EC) to act as the coordinator of a consortium of 11 research institutes to carry out the project entitled: “Factors and Impacts in the Information Society: a Prospective Analysis in the New Member States and the Candidate Countries”.

The main objective of the project was to provide a series of national monographs studying the development of the Information Society (IS), including both the positive and negative impacts, in each of the candidate countries. These monographs<sup>1</sup> offer an assessment of the strengths and weaknesses of each country regarding the development of the IS, and a view on possible outcomes; both strongly rooted in factual quantitative data. They provide a clear, contextualised, multi-factoral and multi-causal picture of the input factors that contribute to the success or failure of IS developments, and the relevant output parameters that support mid- and long-term impacts on economic growth, employment and other relevant aspects of the future of each country. Each monograph concludes with a set of alternative scenarios for the development of IS in that country.

This report, prepared by the Project Coordinator, (ICEG EC), synthesises the findings of the thirteen national monographs. It offers an integrated and prospective view on the future outlook for the Information Society in the Candidate Countries and can be found on the FISTE (Foresight in Information Society Technologies in Europe) website: <http://fiste.jrc.es/>

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<sup>1</sup> All thirteen reports are listed in the References and are freely available on the web at: <http://fiste.jrc.es>



## EXECUTIVE SUMMARY

### Background and Objectives

This report was prepared by the International Centre for Economic Growth (ICEG EC), Hungary, on behalf of the Institute for Prospective Technological Studies<sup>2</sup> as part of a broad foresight activity aimed at reaching a better understanding of the uncertainties and challenges associated with the Enlargement process over a 10-year horizon. It consolidates the findings of 13 country monographs<sup>3</sup> that focus on the development of the Information Society in the New Member States and Candidate Countries. The main objectives of this report are to offer an integrated view IS developments in these countries and to suggest appropriate policy measures to support their further development in line with the Lisbon Strategy.

### Key Findings

The consolidated findings can be grouped under 4 main headings:

#### **1. Benchmarking the IST-related Lisbon structural indicators in the New Member States and Candidate Countries**

It was found that there were significant differences between the 13 countries analysed when measured against the EU-15 average figures for the Lisbon structural indicators. The fact that these countries start from very different levels of economic development should be taken into account in the formulation of country-specific measures in support of IS development.

The data indicate that five Central European countries (Poland, the Czech Republic, Hungary, Slovakia and Slovenia), and also Cyprus, are closest to the EU-15 average in most of the Lisbon indicators, while the South Eastern European countries (Romania, Bulgaria and Turkey) lag considerably behind. The four remaining countries (Estonia, Latvia, Lithuania and Malta) achieve middle positions between these two groups. The ten New Member States as a group come close to the EU-15 values in only two of the six indicators - i.e. spending on human resources (thanks to high spending in the Baltic countries) and employment rates.

During the last decade, there has been progress in the New Member States and Candidate Countries in most of Lisbon indicators, especially in terms of GDP per capita, employment rates, and productivity levels. Nonetheless, there is still a very significant gap between these countries and EU-15. In many indicators, convergence has been, and will continue to be, a slow process.

#### **2. The Use of Information Society Technologies and the Information Communication Technologies Production Sector**

Both IST use and the ICT production sector play an important role in IS development. This was recognised in the Lisbon Strategy and received special attention in the thirteen country studies on which this Synthesis Report is based.

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<sup>2</sup> IPTS is one of the 7 institutes of the Joint Research Centre (JRC) of the European Commission. (<http://www.jrc.es>)

<sup>3</sup> The research project was called 'Factors and Impacts in the Information Society: A Prospective Analysis in the New Member States and Candidate Countries'. All 13 reports are listed in the References at the end of this report and are freely available on the web at: <http://fiste.jrc.es>

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## **IST Use**

IST use across the 13 countries analysed lags considerably behind both the EU-15 average and the figures for the individual countries of EU-15. In recent years, this gap has widened rather than narrowed in some crucial indicators (i.e. fixed telephone lines penetration rates, PC ownership, broadband penetration, etc.), though six countries clearly emerge as frontrunners: the Czech Republic, Estonia, Hungary, Malta, Slovenia, and to a lesser extent, Cyprus.

The lower levels of IST use in the New Member States and Candidate Countries are sometimes critical. For example, the low level of PC use in households, the high access prices and the low share of broadband access should be priority policy areas. Nevertheless, time series data also show several positive developments in these countries. For example, the speed of expansion of IST has significantly increased in recent years. Furthermore, governments have devoted increasing attention to this sector, as compared with the late 1990s.

Finally, it appears that some countries will be able to leapfrog ahead in certain areas by exploiting previous IS developments in EU-15 (e.g. in technology). In general terms, the thirteen countries analysed may be able to catch up with the EU-15 faster if competitive market conditions are fostered. The increase of mobile penetration rates, and the rapidly increasing level of Internet use show that very fast quantitative and qualitative development is possible in these countries, so long as there is commitment to putting the right policies in place and the available resources are fully utilised.

## **The ICT production sector**

Data on the ICT sector itself indicates that certain countries (mainly the Czech Republic, Estonia, Hungary and Malta) have a slight lead in ICT production capacity. Slovenia, Poland and Turkey also have some strength in ICT production, though this sector is relatively less important for their economies. ICT production capacity has developed in a specific way in each of these countries.

However, total ICT output in the 13 countries is well below the EU-15 levels. The addition of this ICT output, after Enlargement, to the European total will not radically change the size of the EU contribution to ICT-production world-wide. What may change, however, is the internal division of labour in ICT production between the old and new Member States, as the latter could be competitive enough to attract some ICT investment away from the existing Member States. Enlargement could therefore result in the relocation of ICT production within the EU-25.

The future of the ICT sector is very country-dependent. Some of the larger countries (Poland, Turkey and Romania) may be able to profit from the size of their domestic markets and develop a more competitive and stronger ICT sector, partly oriented towards domestic sales. In others (Hungary and Estonia), structural reforms could increase productivity and may help them to overcome competitiveness problems. Thus they would maintain their leading position in ICT production in the region. Finally, some others (Slovenia, Czech Republic, Romania and perhaps Slovakia) could become more competitive by exploiting market niches where they have long-standing advantages over other producers.

### 3. Socio-economic factors affecting ICT/IST development

Analysis of a range of socio-economic determinants of IS development in the late 90s shows that there have been real differences between the 5 “leading” countries (Czech Republic, Estonia, Hungary, Malta, Slovenia) and the others, which explain the better performance of the former group. The differences can be summarised as follows:

- better structural, and economic legacies which have resulted in less costly structural reforms, smaller social and regional divides, and lower social costs
- A more positive approach to privatisation, liberalisation, and foreign direct investments
- Location has also been important: all five leading countries are close to major markets and sources of FDI inflows and therefore they have been better integrated than others to the European production networks
- Early implementation of policies specifically focused on IS developments. Up until now, only a few of those countries have implemented effective IS policies. The experience of these few that made committed policy efforts early on, however, has demonstrated that the right policy can make a real difference to IS development
- Smaller social and regional divides were an important advantage as regards demand for ISTs.

These factors have been taken into account in the following suggestions for policy targets and instruments.

### 4. Policy Targets and Instruments

The report indicates the need for a shift in current targets and instruments. Four main targets are identified:

- i. Widespread availability and use of Broadband
- ii. Greater supply and content of eGovernment services
- iii. Broader and easier access by households and SMEs to IS services
- iv. Higher levels of public/private sector spending on Information Society development.

The report concludes by suggesting that a mix of direct, indirect and ICT sector-specific policy instruments could be used to achieve the above targets. For example, more public funding should be directly focused on IS development (by supporting Broadband and the digitalisation of public services, improving content and widening access to the Internet and IS applications in both households and the SME sector). The provision of stable economic growth and the right macroeconomic conditions by governments will, in turn, favour IS development. More public money should be devoted to R&D, with an increased focus on applied research. Public/private partnerships could be an effective means of increasing funds available for IS development and public sector reform. As regards ICT sector-specific policies, competitiveness could be stimulated by the reduction and simplification of regulation, and lower taxes. FDI inflows should be encouraged and better integrated to ensure that the benefits spill over into the rest of the economy. Finally, specific policy instruments must be applied to ensure the necessary quantity and quality of human and physical capital – this would attract FDI and enable countries to compete in higher value-added ICT production.



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## FREQUENTLY USED ABBREVIATIONS

**ADSL** – Asymmetric Digital Subscriber Line

**THE ACC-3-** Associated Candidate Countries

**B2B** – Business to Business

**B2C** – Business to Consumer

**CEC-5-** Central European Countries (Poland, Czech Republic, Slovakia, Hungary and Slovenia)

**CEFTA** – Central European Free Trade Agreement

**DAI** - Digital Access Index

**EAN** – European Article Numbering

**EITO** - European Information Technology Observatory

**ERA** -European Research Area

**ESIS** - European Survey of Information Society

**EU** - European Union

**EUR** - Euro

**FDI** – Foreign Direct Investment

**GDP** - Gross Domestic Product

**GPRS** – Global Positioning Radio System

**GSM** – Global System of Mobile Communication

**G2B** – Government to Business

**G2P** – Government to Public

**3G** – Third Generation

**HDI** - Human Development Index

**ICT** - Information and Communication Technologies

**IS** - Information Society

**ISDN** - Integrated System of Digital Network

**IST** - Information Society Technologies

**IT** – Information Technology

**ITU** – International Telecommunications Union

**LLL-** Life Long Learning

**NACE** – Nomenclature Général des Activités Economique dans le Communautés Européennes

**NATO** - North Atlantic Treaty Organisation

**NMS-** New Member States (of the European Union)

**NDP-** National Development Plan

**NUTS** - Nomenclature des Unités Territoriale pour Statistique

**OECD** - Organisation for Economic Cooperation and Development

**PC** – Personal Computer

**PPP** – Purchasing Power Parity

**PPS** – Purchasing Power Standard

**R&D** – Research and Development

**R&U** - Research & University

**SMEs** - Small and Medium Enterprises

**SIBIS** - Statistical Indicators Benchmarking in the Information Society

**SPD-** Single Programming Document

**UMTS** - Universal Mobile Telecommunication System

**WIPO** - World Intellectual Property Organisation

**WTO** - World Trade Organisation



## INTRODUCTION

In March 2000, the EU-15<sup>4</sup> Heads of Government, meeting at the European Council in Lisbon, set a goal for Europe for the next decade to become “the most competitive and dynamic knowledge-based economy in the world”. They called for Europe to rapidly exploit the opportunities of the knowledge-based economy. In response to this call, the eEurope Action Plan was launched at Feira Summit in June 2000.

In May 2000, these strategic goals were recognised at the European Ministerial Conference held in Warsaw and it was decided to launch an action plan similar to eEurope, called eEurope+. In February 2001, the European Commission invited Cyprus, Malta and Turkey to join the other Candidate Countries (as they were then)<sup>5</sup> in defining and implementing this common Action Plan.

Subsequently, eEurope and eEurope+ were merged to form the eEurope 2005 Action Plan, which was endorsed by the Sevilla Summit in June 2002. This aimed “to provide a favourable environment for private investment and for creation of new jobs, to boost productivity, to modernise public services and to give everyone the opportunity to participate in the global Information Society.” Its actions cover the EU-15, the New Member States and Candidate Countries and the eEurope Steering Committee includes members from all these countries.

In 2000, the Institute for Prospective Technological Studies (IPTS)<sup>6</sup> launched a broad foresight activity which aimed at reaching a better understanding of the uncertainties and challenges associated with the Enlargement process. The “Enlargement Futures” project examined the main contemporary technological, economic, political and social drivers and their impact on science and technology policy, competitiveness and employment in the wider European Union over a 10-year horizon.

High political priority was assigned to Information Society (IS) developments in the Candidate Countries, and it was decided that, within this field, trends in the development and use of Information and Communication Technologies (ICTs) should be given specific attention. ICTs were therefore made the subject of a series of workshops and a separate research programme.

The project “Factors and Impacts in the Information Society: A Prospective Analysis in the acceding and Candidate Countries” was launched in 2003 as part of this research programme. The overall aim was to provide a series of national case-studies, describing and explaining the specific issues related to the development of the supply of and demand for ICTs and their impacts in these countries. Each national development was to be presented as a contextualised, multi-causal, multifaceted and comprehensive picture of the most relevant aspects.

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<sup>4</sup> EU-15: The period of elaboration and publishing of this report has coincided with the Enlargement process itself. When referring in this report to EU-15, the author points at the 15 “former” EU Member States, as of before 1<sup>st</sup> of May 2004

<sup>5</sup> The ten New EU Member States are the Baltic republics of Estonia, Lithuania and Latvia, the Mediterranean countries of Malta and Cyprus and the Central European countries of Czech Republic, Hungary, Poland, Slovakia, and Slovenia. These ten countries joined the EU in May 2004: Bulgaria and Romania are expected to join in 2007, while Turkey’s joining timing is under analysis. Together they form the group of three Candidate Countries.

<sup>6</sup> IPTS is one of the seven research institutes of the Joint Research Centre (JRC) of the European Commission (<http://www.jrc.es>)

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The International Centre for Economic Growth (ICEG EC), Hungary, co-ordinator of the research project, has prepared this final Synthesis Report based on these country monographs. It tries to identify the common factors affecting the development of Information Society in the New Member States and the three Candidate Countries. The Synthesis Report aims to consolidate the findings of the 13 country monographs with the research results of other international research programmes (SIBIS Report, OECD, World Bank, DG INFSO). This final report consists of a review of the monographs, their prospective insights, their general conclusions and their policy implications. It offers comparative elements concerning factors and impacts related to the development of the Information Society. It also integrates the elements developed in each monograph, going beyond the simple aggregation of discrete results and looking at the New Member States and the Candidate Countries as a whole.

This final report is structured as follows. Chapter I summarises the relative position of the New Member States and the Candidate Countries in terms of those Lisbon indicators that are most relevant for the development of the Information Society. Six indicators are used to compare the New Member States and Candidate Countries with the EU-15 average, showing both the progress towards meeting the Lisbon targets and the gaps that exist between these countries and the EU-15 average.

Chapter II presents some quantitative data about the Information Society (IS) in the New Member States and the Candidate Countries. It starts with a comparative assessment of the spread and use of Information Society technologies (IST) in these countries, using those indicators that cover the widest range. This section is followed by the presentation of data regarding the production side of the ICT sector (ICT) and finishes with a qualitative assessment and grouping of the countries in terms of their position in IST and ICT development. This distinction between IST and ICT sides is specific to this report and further explained in the report itself.

Chapter III presents the main factors affecting the development of the use and supply of Information Society technologies in New Member States and the Candidate Countries. Bearing in mind the considerable differences in the countries' major economic indicators (size, economic structure, level of development, openness), and their economic history (transition vs. market economy), this report identifies those factors which have influenced IST and ICT developments in the past and are likely to have an influence in the future. The purpose is to show which factors influenced past developments and, at the same time, to provide input for policy lessons and suggestions.

Chapter IV gives a brief account and assessment of Information Society-related government policies in the New Member States and the Candidate Countries.

Chapter V indicates those new factors that are likely to influence, in the short- to medium-term, the evolution of the Information Society in these countries. This analysis is based on the foresight assessment provided by the country monographs. Finally, Chapter V also provides some policy suggestions and conclusions based on recent experiences and identifies future trends in the New Member States and the Candidate Countries.

Much of this report is based on the data and analysis available in the thirteen country case studies produced by the project "Factors and Impacts in the Information Society: A Prospective Analysis in the acceding and Candidate Countries".<sup>7</sup> Also acknowledged is the valuable creative and critical support offered by the external experts who participated in the International Expert workshop: "*Enlarging the European Information Society: Potential*

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<sup>7</sup> All thirteen reports are listed in the References and are freely available on the web at: <http://fiste.jrc.es>

*Information Society Strategies towards Lisbon 2010 objectives.* This was organized by IPTS, DG JRC, European Commission, and took place in Seville on 18-20 February 2004.



## CHAPTER I: A BRIEF INSIGHT INTO SELECTED LISBON INDICATORS

### *a. Methodological note*

The European Council held in Lisbon in March 2000 called for the creation of a set of structural indicators targeted at the major challenges identified at the Summit, which should be internationally comparable at European level and offer a suitable basis for benchmarking and policy decision-making. These indicators, applied since to the New Member States and the Candidate Countries, give an insight into the relative position and most recent evolution of these countries in a variety of domains such as growth, employment and R&D.

The following sections aim to give a brief overview of some of these indicators, as they relate indirectly to various facets of the Information Society development and may help us understand part of the dynamics supporting this development. They also give an initial insight into the differences that exist among those 13 countries which too often are simply taken as a homogeneous group of “new” Member States or EU Candidates.

Only one of the Lisbon indicators - ICT spending / GDP - is directly to do with Information Society development. It is meant to reflect, in a synthesised way, the uptake of Information and Communication Technologies in a given country, by measuring the relative size and by benchmarking national investment in these technologies. This report offers some insights about this indicator in Chapter II.

Most of the remaining Lisbon indicators are not directly connected with the Information Society, but six may be seen as linked indirectly to this process of change: GDP per capita, labour productivity, employment rate, long-term unemployment, spending on human resources, and R&D / GDP ratio.

We might consider that two of these indicators - GDP / capita and long-term unemployment rates - indirectly reflect some aspects of the potential for accessing information technologies and services by individuals. As such, they offer an insight into some aspects of the demand side of the Information Society.

The other four indicators give insights into the supply side of the Information Society and point at factors which might influence the production of information technologies and services, in particular their location. These factors are labour productivity, employment rate, spending on human resources and R&D and they affect investment decisions, comparative advantages and the competitive position of countries.

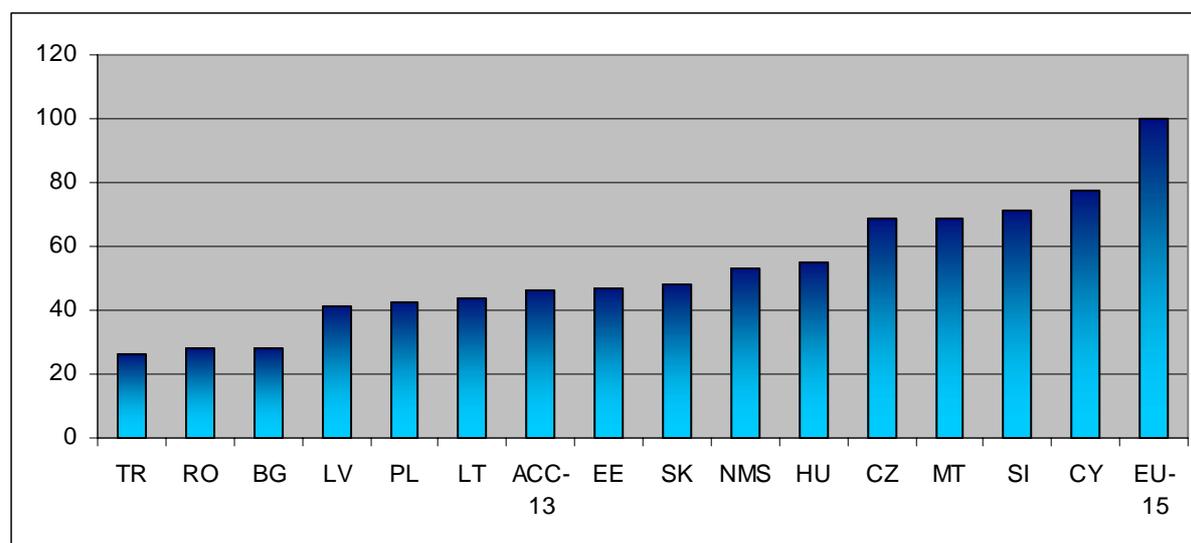
Considering that these six indicators have some indirect relation with the demand or supply side of the Information Society, it is worthwhile presenting the performance of each New Member State and Candidate Country. This can be compared with the EU-15 average, while keeping in mind that this does not cover all the Lisbon structural indicators, nor does it cover all aspects of an Information Society. However, it is useful as it gives us an initial profile for each of the countries observed.

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*b. Snapshot and dynamic evolution of the selected Lisbon indicators*

The New Member States and the Candidate Countries represent a heterogeneous group in terms of their per capita GDP. Two of them have high incomes (Cyprus and Slovenia), where per capita GDP on PPS approaches 80% of the EU-15 average and the gap between PPS and actual exchange rate is also relatively small compared to other countries.<sup>8</sup> The majority of countries have upper/middle incomes, where per capita GDP is around half of the EU-15 average. The Baltic<sup>9</sup> and the Balkan countries have per capita GDP levels around one third of the EU average on PPS terms.<sup>10</sup>

**Chart 1. Per capita GDP in New Member States and Candidate Countries in PPS terms, 2003 and EU 15=100<sup>11</sup>**



Source: Eurostat, *Country Monographs*

The differences between the new and old members of the EU are still sizeable, but have been narrowing in recent years, thanks to the growth differences between the New Member States and Candidate Countries and EU-15, and to the observed appreciation of exchange rates. For the period 1998-2002, the average difference in GDP growth rates between the average of the EU-15 and the five Central European New Member States (CEC-5) was 3%, and between all thirteen countries analysed and the EU-15 average it was 2.5%.

When looking at the time series, the dynamic picture shows that the catch up of individual countries occurs at varying speeds. Some countries have experienced growth problems and

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<sup>8</sup> The gap between the actual and equilibrium exchange rate reflects the differences in price and income convergence achieved by the New Member States and Candidate Countries. The smaller the gap, the stronger progress has been achieved in income and price convergence and as a result actual exchange rates approach long-term equilibrium ones.

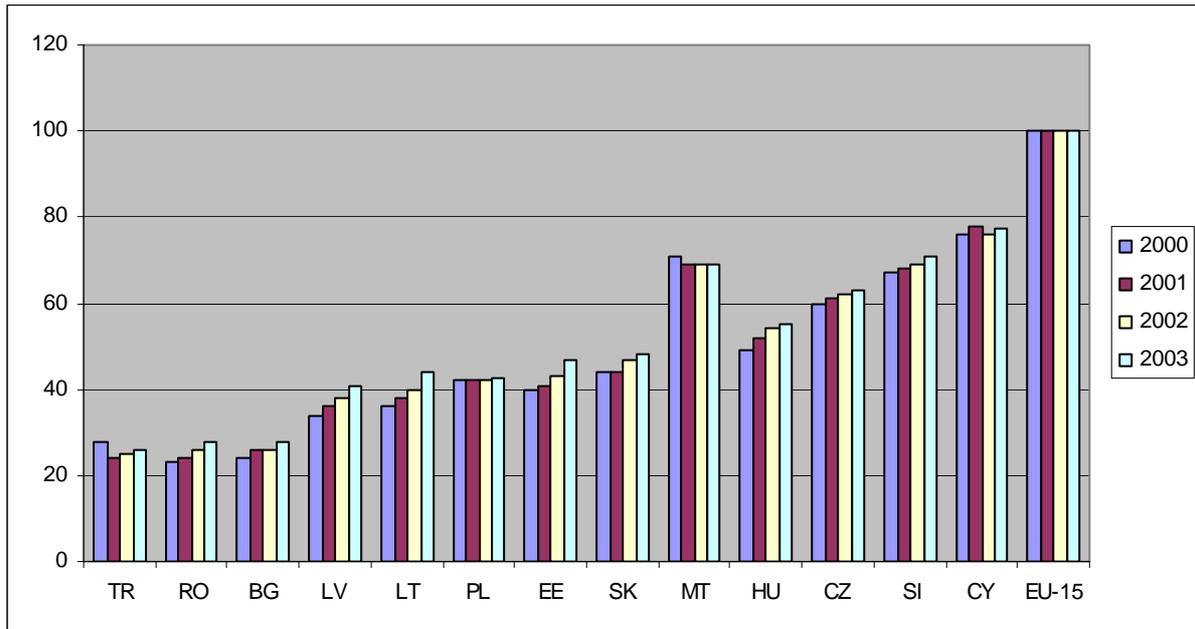
<sup>9</sup> With the exception of Estonia, which however has per capita GDP level lower than the CEC-5 group.

<sup>10</sup> In case of the Balkan countries the deviation of the actual exchange rate from the PPS one is much above the Central European levels, making the difference of per capita GDP on actual exchange rate much higher for these countries than for other the Accession ones.

<sup>11</sup> ACC-13 represents the unweighted average of the 13 countries analysed.

their convergence has recently slowed down or even been reversed: Cyprus, Malta, Turkey, and Poland and to some extent Czech Republic are the relevant examples. On the other hand, in recent years the Baltic countries have been able to reduce the income gap the fastest, thanks to their rapid GDP growth, while the same occurred - though at lower rates – in the Central European economies of Slovenia, Hungary and Slovakia. The less developed candidate countries (Romania and Bulgaria) have also overcome most of their structural and macroeconomic problems and started to grow well above the growth rates of EU-15.

**Chart 2. The evolution of per capita GDP in PPS terms, 2000-2003 and EU-15=100**



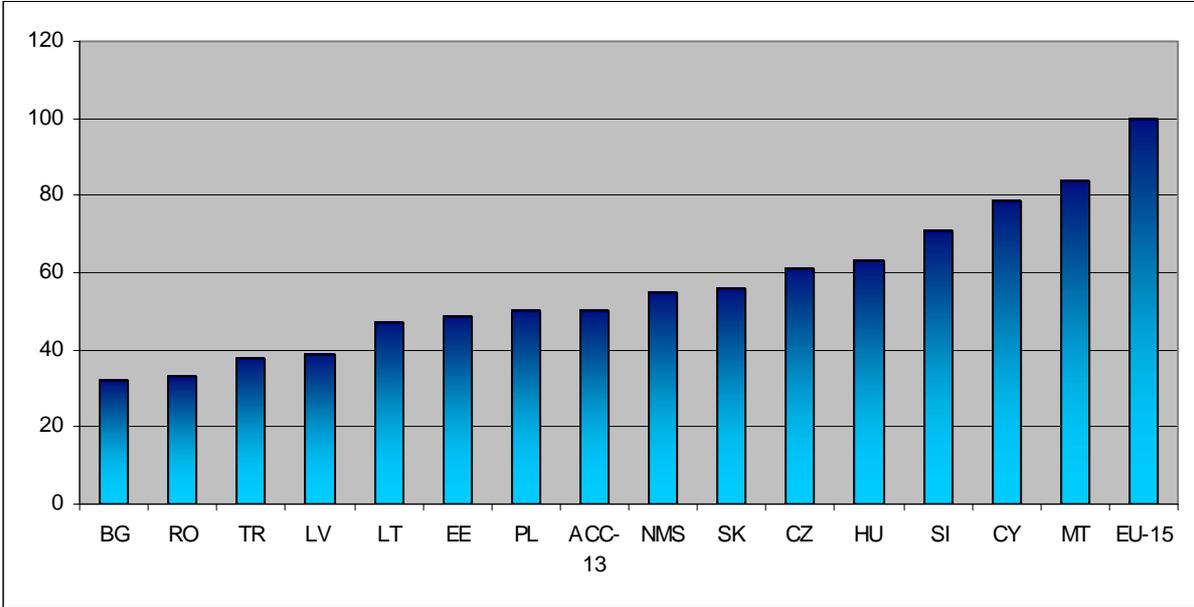
Source: Eurostat and Country Monographs

This structural indicator, illustrating one facet of the Lisbon targets of growth and economic development, also relates indirectly to Information Society development. While GDP/capita, particularly when expressed in PPS terms, may reflect consumption and investment capacities (and hence some aspects of the demand side for Information and Communication Technologies), it also behaves as an output indicator of economic activity, which includes the economic impact on GDP of ICT investment and use, as well as ICT production to a smaller extent.<sup>12</sup>

<sup>12</sup> Such analysis is strongly supported by an extensive international literature even though its application to the 13 New Member States and Candidate Countries is a more recent effort. See for example Bart van Ark and Piatkowski (2004).

There is a similar pattern of distribution among the countries in terms of labour productivity levels. There are only three countries where labour productivity exceeds 60% of the EU-15 average: Cyprus, Slovenia and Hungary. On the other hand, the four poorest countries (Bulgaria, Romania, Turkey and Latvia) are also those with labour productivity levels below 40% of the EU-15 average. Two groups of countries also deserve attention because of the gap between their per capita GDP and labour productivity. Hungary, Poland and Bulgaria have recorded sizeable positive gaps between labour productivity and per capita GDP, reflecting the fact that wage convergence has been lagging behind income convergence. The reverse is true for Slovenia and the Czech Republic, where labour productivity levels have lagged behind income convergence, reflecting the fact that wage growth has exceeded income. In the case of the remaining countries, the two indicators are almost at exactly the same level.

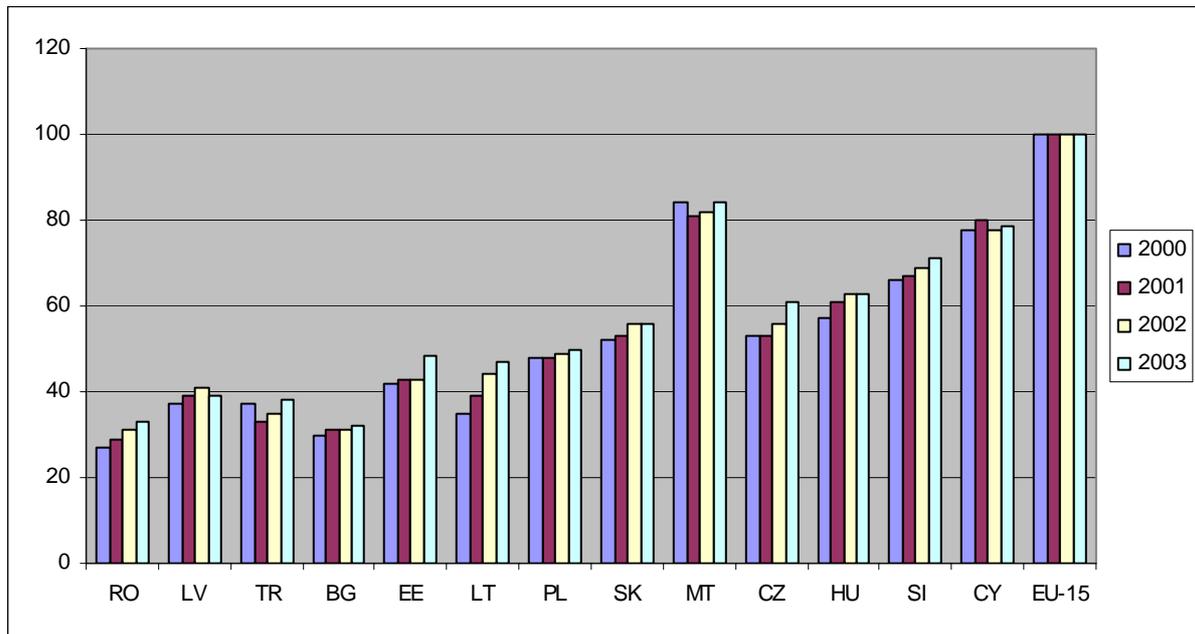
**Chart 3. The level of labour productivity in New Member States and Candidate Countries, 2003 and EU-15=100**



Source: Eurostat and Country Monographs

While there is a considerable gap in the average level of labour productivity between the EU-15 and the New Member States and Candidate Countries, increases in the New Member States and Candidate Countries have recently outpaced growth in the European Union, driven in some countries by a spectacular rise in manufacturing productivity. The faster increase in productivity is also a reflection of the catch up process and the differences in return on capital in the two country groups.

**Chart 4. The changes in labour productivity in the New Member States and Candidate Countries, 2000-2003 and EU-15=100**



Source: Eurostat and Country Monographs

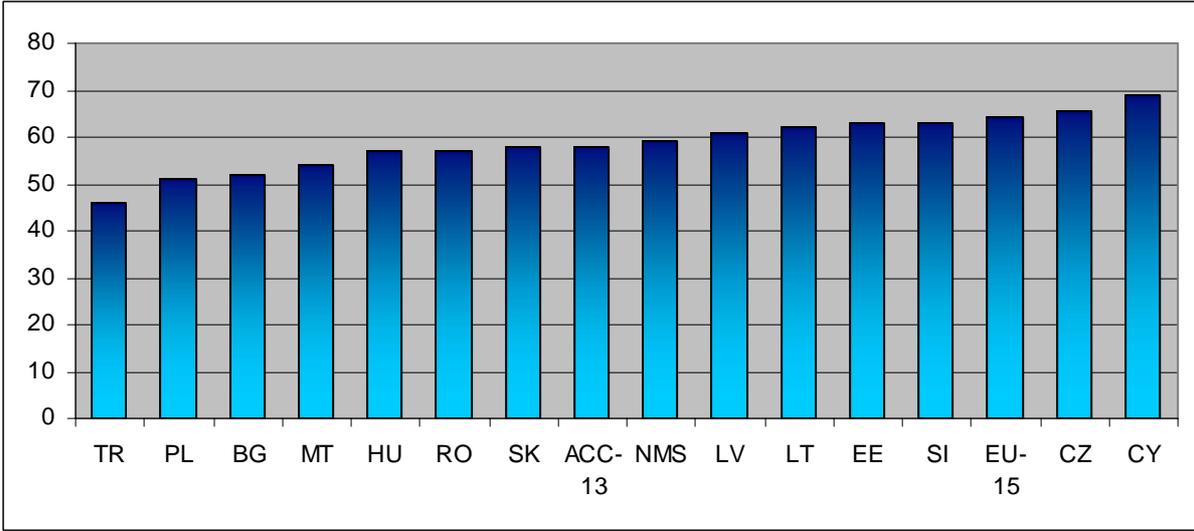
At the same time there have been quite significant differences in productivity growth in the New Member States and Candidate Countries. Several of them, at very different levels of economic development (Romania, Hungary, Czech Republic, Slovenia and Lithuania) recorded spectacular rises in productivity, while others (Latvia, Poland, Malta and Cyprus) have experienced stagnation. In the former group, growth was mainly due to relatively fast GDP increases, growth of investments and accelerated capital deepening, which has been less pronounced in the latter group.

Finally, it has to be noted that increases in labour productivity have been achieved either with unchanged employment rates (Hungary, Slovenia) or a continuous reduction of employment (Poland, Slovakia, Romania). This shows the smaller contribution of output development to productivity change and the overwhelming effect of labour market dynamics. Even those countries where sizeable increases in labour productivity were achieved need to maintain this growth with an increase in employment rate and improvement of labour market conditions.

The level of labour productivity and IS development are also closely linked to each other. On the one hand, labour productivity levels and changes influence investor decisions on choosing production location and thus on deploying ICT industries in individual countries. Labour productivity plays a more important role in influencing investment and location decisions of ICT producers than it does in other industries. On the other hand, the way labour productivity increases is also linked to the demand for ISTs. Productivity increases through labour force reduction may be accompanied by widening regional and social disparities, while labour productivity growth accompanied by expanding employment may see these differences declining. The former has a positive effect on the demand for IST, while the latter, as might be expected, has a negative effect.

The employment rates of all New Member States and Candidate Countries are well below the 70% Lisbon target and also, with the notable exceptions of the Czech Republic and Cyprus, below the EU-15 average today. The differences among the 13 countries analysed are narrower than they are in per capita GDP levels. Some countries, however, have very low employment levels - the average level of the 13 countries was 58.2% in 2002, and for the New Member States it was around 60%. The two most sizeable economies, Poland and Turkey, have employment rates of around 50%.

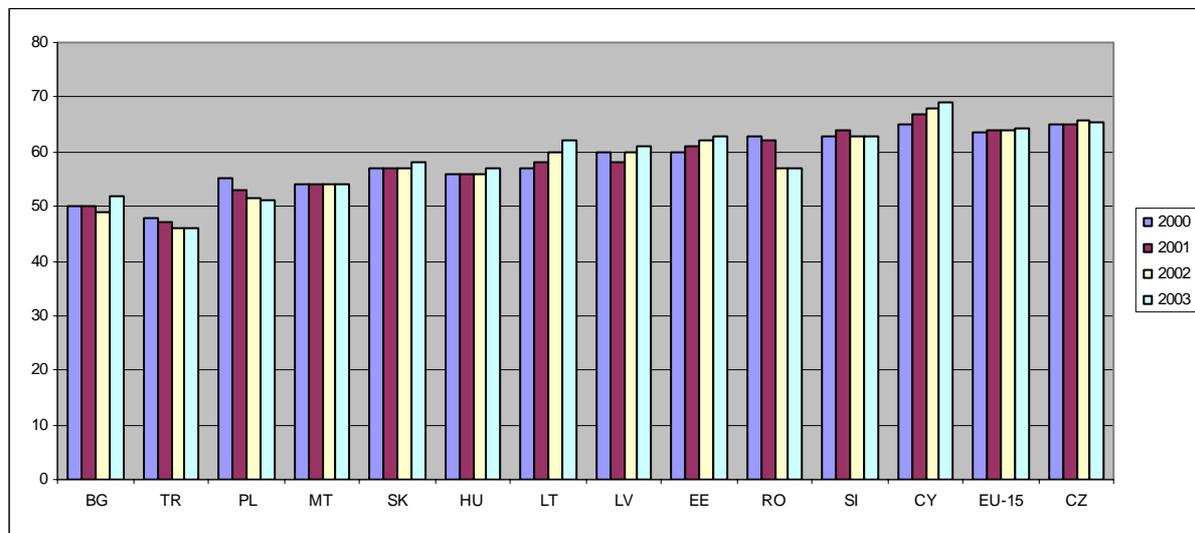
**Chart 5. Employment rates in the New Member States and Candidate Countries, 2003  
in %**



Source: Eurostat and Country Monographs

The evolution of employment rates also shows a different pattern in the 13 countries analysed. Some countries have experienced either declining (Poland, Romania and Turkey) or stagnating (Czech Republic and Slovenia) employment rates. Restructuring and structural reforms have been the main factors behind the worsening employment indicators, which coincided with significant slowdown and layoffs in the tradable and non-tradable sector. In other countries, employment rates have increased in the past four years. In some countries (Baltic countries, Bulgaria) this was related to very fast GDP growth, which spilled over to increase employment, while in others (Slovakia, Hungary) it has been more due to labour market reforms and reduction of the parallel economy.

**Chart 6. Changes in employment rates of New Member States and Candidate Countries, 2000 and 2003 in %**



Source: Eurostat and Country Monographs

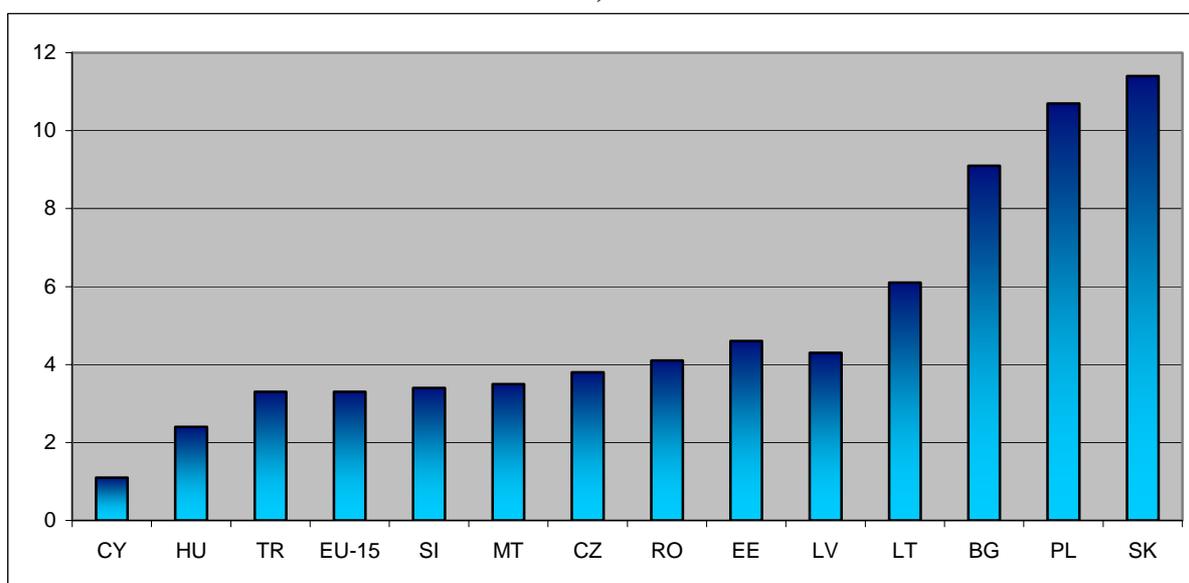
Another important Lisbon indicator reflecting labour market conditions is the share of long-term unemployed among the total unemployed. There are significant differences between the New Member States and Candidate Countries, as there are between the EU-15 countries. Their level of long-term unemployment, however, is above that of the former EU-15 Member States. This is due to the impact of several factors, the most important of which are the overall higher unemployment rates, ongoing structural changes and remaining labour market rigidities.<sup>13</sup>

While there are five countries where long-term unemployment is below or around the EU-15 average (i.e. in the three small countries - Cyprus, Malta and Slovenia), and two economies with low unemployment rates (Hungary and Romania), the rates in the remaining countries are much higher than in the EU-15. In the Baltic countries, the rate is almost double, while in countries with high unemployment rates (Bulgaria, Poland, and Slovakia) it is more than three times higher than the EU-15 average.

While these countries show significant variation in regional unemployment rates, there is a positive correlation between the level of unemployment and long-term unemployment on the one hand and the dispersion of unemployment rates at NUTS-2 levels on the other. Economies with higher unemployment and long-term unemployment rates (Bulgaria, Slovakia and Poland) have greater differences in unemployment rates between the individual regions.

<sup>13</sup> Higher unemployment rates and structural transformation increase the number of those who get out of the labour markets with low probability of return, while labour market rigidities increase the costs of labour search.

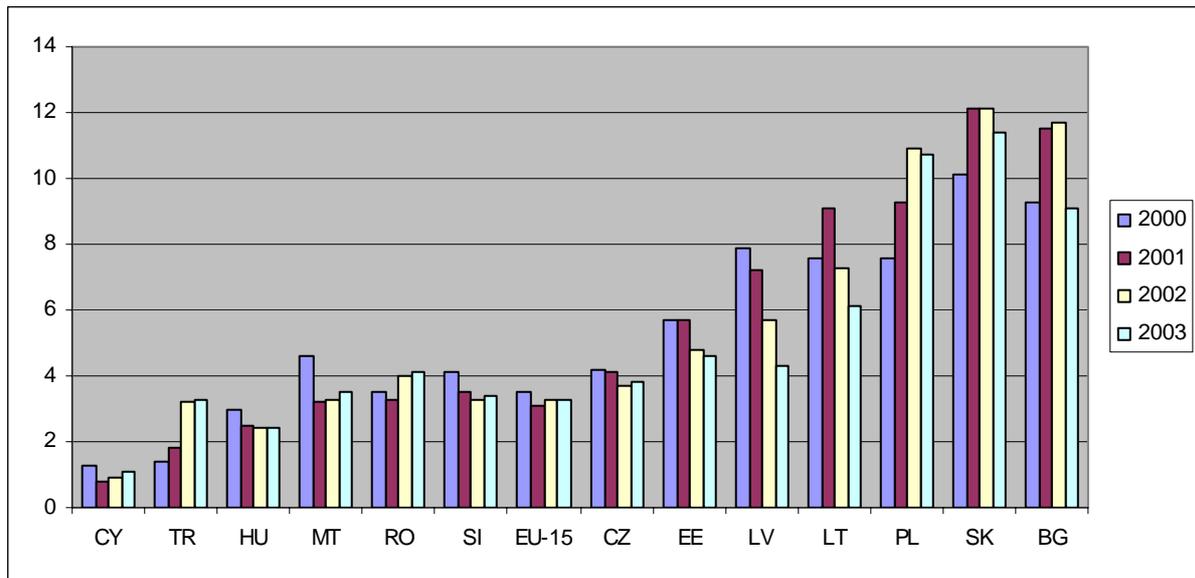
**Chart 7. Long-term unemployment rates in the New Member States and the Candidate Countries, 2003 in %**



*Source: Eurostat and Country Monographs*

Though the level of long-term unemployment is considerably higher in the New Member States and Candidate Countries, there are positive signs that it has declined in recent years. Strong declines were recorded in all Baltic States and Bulgaria. In countries with long-term unemployment rates close to the EU-15 average, however, the decline was more gradual. Accelerating growth and changes in labour market regulations (and sometimes the fact that people, though unemployed, may not be registered as such) are behind the declines observed. However, the two countries with the highest long-term unemployment rates (Slovakia and Poland) have so far been unable to transform the acceleration of economic growth into job creation and have experienced only a limited decline in the rate due to ongoing structural changes.

**Chart 8. Changes in long-term unemployment rate in New Member States and Candidate Countries, 2000-2003 in %**

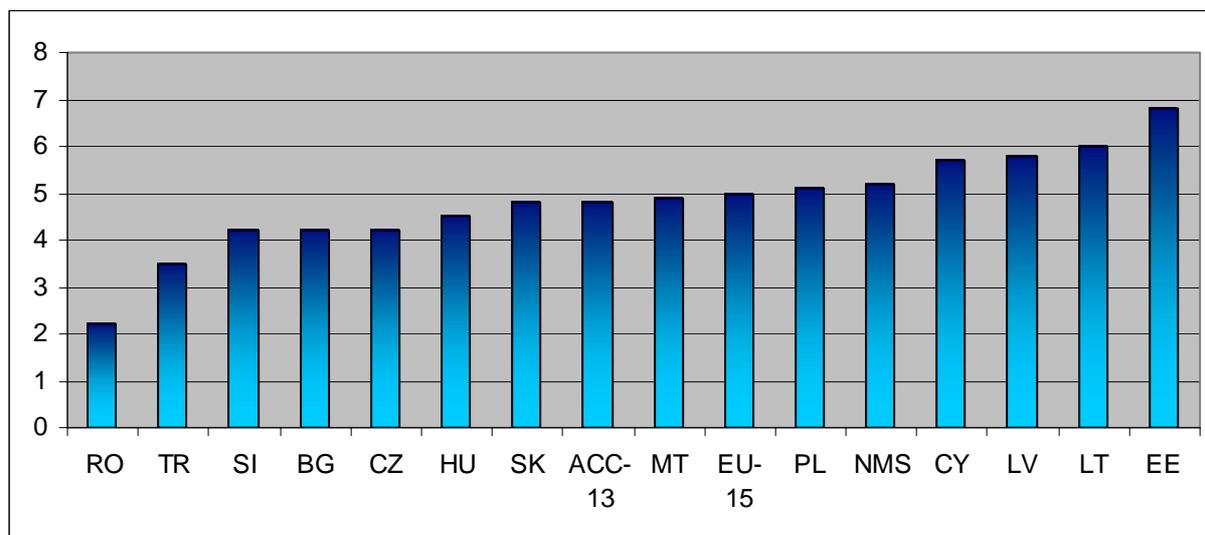


*Source: Eurostat and Country Monographs*

Employment and long-term unemployment rates have a direct link to the Information Society, mainly related to the demand for IST. Both indicators strongly reflect regional and social differences and give some hints about the likelihood of equal access to IST services and goods. While other factors matter too, generally countries that have higher long-term unemployment and share of population out of the formal labour markets, have lower penetration rates for Information Society indicators. Labour market distortions and difficulties may also have a negative effect on the information economy: high long-term unemployment and low employment rates can serve as a reflection of structural problems, which may reduce the willingness of domestic and foreign investors (“wait and see” attitude) to invest in the ICT sectors.

Human resource spending in the 13 countries analysed is close to the EU-15 average, with the exception of Turkey and Romania which spend much less, and the Baltic countries, which spend relatively more. While there are differences between the countries in the quality of spending on human resources, in quantitative terms its level is close to the Lisbon targets. In general, this performance reflects the strong preference given in the past by Eastern European economies to education and human resource development.

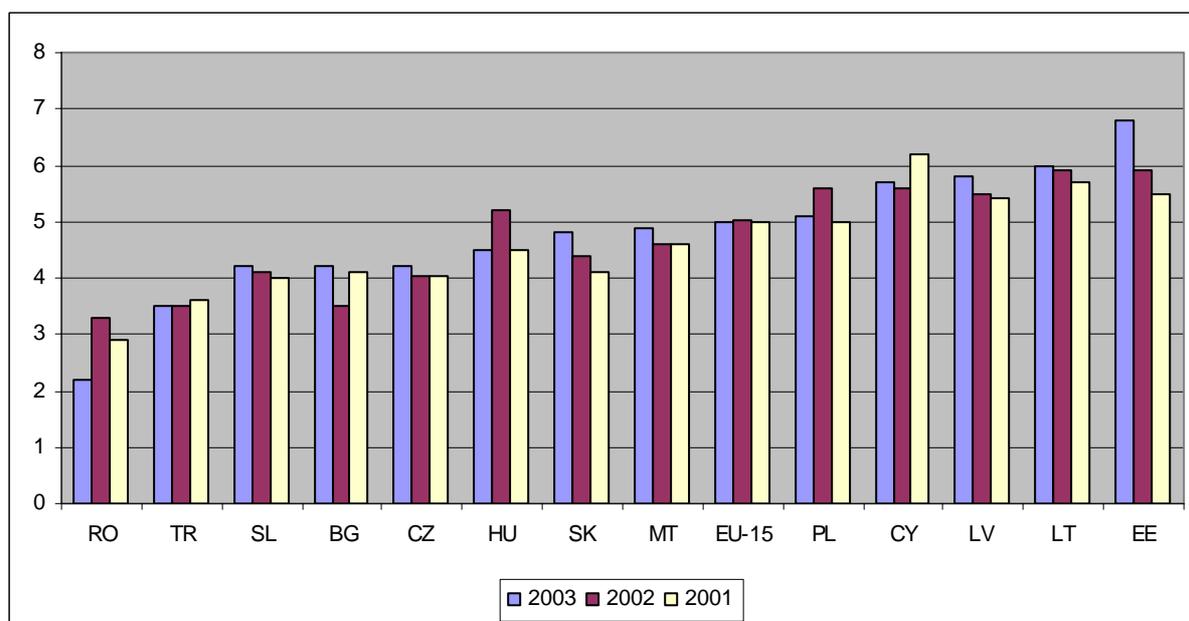
**Chart 9. Spending on human resources in New Member States and Candidate Countries, in 2003 in % of GDP**



Source: Eurostat and Country Monographs

The annual changes in spending on human resources are country specific, though two country groups are discernable. The first group (Slovakia, Estonia, Malta and Latvia) has increased spending in absolute terms in recent years. This reflects the increased attention paid by policy makers to education and human resources. In the majority of the analysed countries, however, spending relative to GDP declined as a result of growing fiscal tensions, and the reduction of both private and public sources for human resource spending.

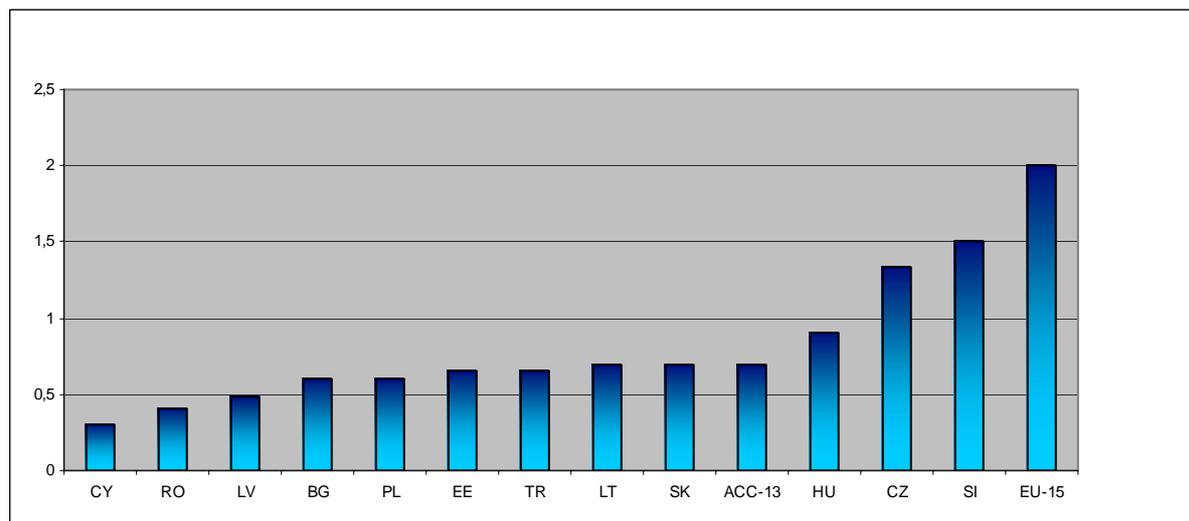
**Chart 10. Changes in spending on human resources of New Member States and Candidate Countries, between 2001-2003 in %**



Source: Eurostat and Country Monographs

R&D expenditure differs completely from spending on human resources. As regards the former, the vast majority of countries are well below both the past EU-15 level and Lisbon targets. Most of the economies devote exceptionally low shares of their GDP to research and development. With the exception of Slovenia and the Czech Republic, the levels are below 1% and, in most cases, around 0.5%. Moreover, as the country studies show, this expenditure has been made mainly by the public sector and the share of the corporate sector in R&D is smaller than that of the EU-15.<sup>14</sup>

**Chart 11. R+D/GDP ratios in the New Member States and Candidate Countries in 2003 in %**

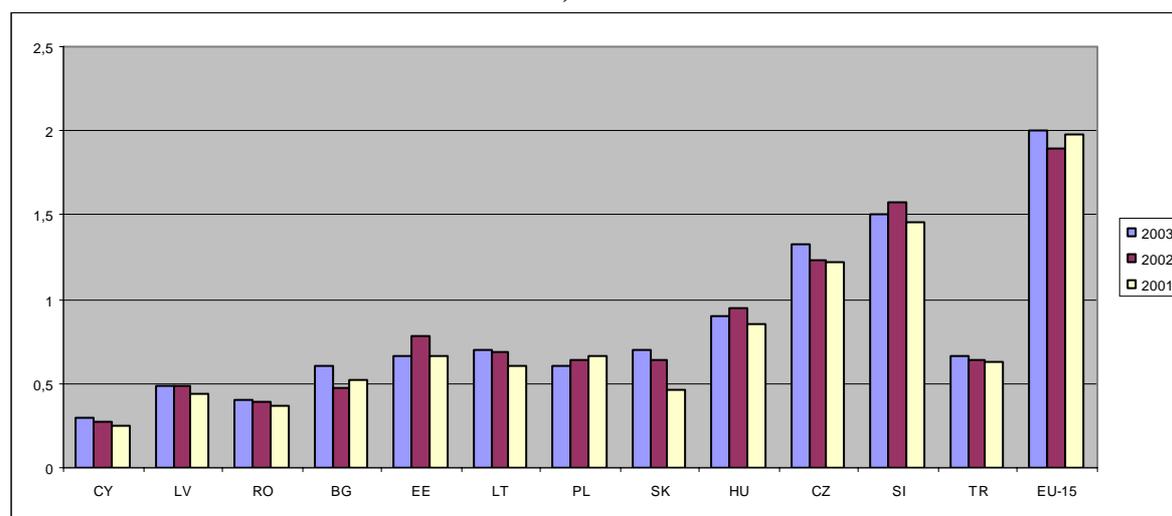


Source: Eurostat and Country Monographs

The recent annual changes in R&D expenditure are not very significant, which is understandable and reflects the low spending capacity of New Member States and Candidate Countries. The annual variations mainly reflect the fiscal constraints and spending levels allowed by the underlying fiscal balances, as the share and level of corporate sector R&D is very low in total spending.

<sup>14</sup> This situation is in a sharp contrast with the recent findings of an OECD study dealing with sources of economic growth in the OECD countries. The OECD concluded that the vast majority of R+D spending in advanced countries was carried out by the private sector, while governments play a small and decreasing in time role in R&D financing. OECD (2003).

**Chart 12. Changes in R&D/GDP ratios in New Member States and Candidate Countries, 2001-2003 in %**



Source: Eurostat and Country Monographs

Both spending on human resources and R&D expenditure have a strong effect on the information economy. They determine the quality of human and physical capital, and thus affect return on capital and investors' decisions on where to invest. The better the supply of human and physical capital in a given country, the more likely it is that investors favour that country.

The few structural indicators presented above already show that there are significant differences between the 13 countries analysed. This should be remembered when reading this report: e.g. behind the general term 'New Member States' there are countries with very different levels of economic development, structural indicators, short-term structural tensions and long-term catch-up potential.

The thirteen countries analysed can be divided into three main groups: the Central European economies (CEC-5), the Baltic countries (included in the New Member States) and the South Eastern-European ones (included in the Candidate Countries). The data confirm that, together with Cyprus, the Central European economies have the smallest gap with the EU-15 average in most Lisbon indicators. The South Eastern European economies lag considerably behind the first two groups.

**Table 1. Comparative position of analysed countries with six Lisbon indicators, 2003**

|                                      | CZ  | CY  | EE  | HU  | LV  | LT  | MT  | PL  | RO  | SK  | SI  | BG   | TR  |
|--------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|
| GDP per capita, EU 15=100            | 60  | 80  | 42  | 57  | 34  | 39  | 55  | 39  | 25  | 47  | 74  | 28   | 22  |
| Labour productivity, EU 15=100       | 56  | 80  | 43  | 66  | 32  | 43  | 55  | 48  | 30  | 54  | 71  | 38   | 34  |
| Employment rate, %                   | 66  | 64  | 62  | 57  | 60  | 60  | 54  | 52  | 62  | 57  | 63  | 49   | 51  |
| Spending on human resources /GDP (%) | 4,2 | 5,7 | 6,8 | 4,5 | 5,8 | 6   | 4,9 | 5,1 | 2,2 | 4,8 | 4,2 | 4,2  | 3,5 |
| R+D/ GDP (%)                         | 1,3 | 0,2 | 0,7 | 0,8 | 0,4 | 0,7 | 0,2 | 0,7 | 0,4 | 0,7 | 1,5 | 0,6  | 0,7 |
| Long-term unemployment (%)           | 3,7 | 1,5 | 4,8 | 2,4 | 5,8 | 7   | 2,6 | 11  | 3,2 | 12  | 3,3 | 12,6 | 1,8 |

Source: Eurostat and Country Monographs

The New Member States as a group are close to the EU-15 values in only two indicators out of the six: spending on human resources (thanks to high spending levels in the Baltic countries) and employment rates (where Poland's low employment rate pulls the Central European figure down).

**Table 2. The relative position of certain country groups vis-à-vis the EU-15 averages**

|                                     | EU-15 | CEC-5 | NMS  | THE<br>CANDIDATE<br>COUNTRIES-13 |
|-------------------------------------|-------|-------|------|----------------------------------|
| GDP per capita (EU-15=100)          | 100,0 | 55,4  | 52,7 | 46,3                             |
| Labour productivity (EU-15=100)     | 100,0 | 59,0  | 54,8 | 50,0                             |
| Employment rate (%)                 | 64,0  | 58,8  | 59,5 | 58,2                             |
| Spending on human resources/GDP (%) | 5,0   | 4,6   | 5,2  | 4,8                              |
| R+D / GDP (%)                       | 1,9   | 1,0   | 0,7  | 0,7                              |
| Long-term unemployment (%)          | 3,5   | 6,5   | 5,4  | 5,5                              |

*Source: Eurostat and own calculations*

During the last decade, progress with most of Lisbon indicators has been observed in the New Member States and Candidate Countries, especially in terms of GDP per capita, employment rate, and productivity levels. However, a very significant gap in most of Lisbon indicators still exists between the EU-15 and the New Members States and Candidate Countries, and convergence in many indicators has been, and will continue to be, slow.

In addition to the comparison of quantitative indicators, particular attention should be paid in some cases to qualitative data (the share and distribution of spending on human resources is a case in point). This is attempted in the following chapters.



## **CHAPTER II: IS DEVELOPMENTS IN THE NEW MEMBER STATES AND CANDIDATE COUNTRIES**

### **I. Methodological introduction**

The analysis of Information Society development in the New Member States and Candidate Countries is presented in this report under two major headings: “Information Society Technologies” (IST) and “Information and Communication Technologies” (ICT). While “IST” refers mainly to the presence, measurement and activity of the demand and user side of these technologies, “ICT” encapsulates instead a synthesised insight into Information and Communication Technology production, the services and industrial sector activity and the usual economic indicators related to this. The distinction is rather didactic and methodological and serves in the report as a support to better understanding of the observed facts.

The level of IST development intends to reflect the extent and readiness in the analysed countries to use information and communication technologies and services by households, companies and governments. IST reflects the demand side of the information and communication technologies sector, showing the extent to which these services and goods are used by the society, have penetrated to everyday life and application. The IST indicators are more social than economic ones, reflecting that they show the level of pervasiveness of the Information Society in a given country’s everyday life, and strongly depend on its social conditions: regional and social divide, education structure, type and structure of governance and policies, etc.

The level of ICT development assesses the ICT production capacity of a given country with the help of traditional economic indicators. These indicators show the contribution of this sector to variables as employment, production, exports and investments. ICT indicators are almost exclusively economic ones as economic conditions (evolution of production factors, their costs, changes in comparative advantages and competitive position) influence their level. Since these factors are country specific, there might be a much bigger difference in the level of ICT development between countries at similar level of economic development. At the same time the evolution of ICT indicators depends also on global trends as the growth of the ICT sector strongly hinges on corporate sector’s decision concerning the allocation of production between individual and competing countries.

There is a two sided causality link between level of economic development and ICT sector. On the one hand there is an extensive theoretical and empirical literature that links differences in growth and productivity performance of advanced economies to the differences in the spread of ICT sector and of the use of information and communication technologies in traditional, non-ICT producing sectors (Stiroh, K.J. (2002), McGuckin R.H. and B. van Ark (2001), Bart van Ark (2004)). At the same time advanced countries with developed institutional and financial structures, competitive production tends to be the major producers in the ICT sector.

Income level and structural features influence besides the geographical location of the ICT producing sectors the evolution of IST indicators as well. The level of incomes and employment, the share of societies’ spending on human resources, the regional and income inequalities strongly influence the level of demand for IST, the extent and equality of the spread of Information Society. The way these channels work strongly depends on the

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economic and societal features of the respective countries, which are partly taken up by the Lisbon indicators.

These two group of indicators, IST and ICT, measure different aspects of the Information Society. As this report will show there is no strong correlation between the level of development in IST and ICT indicators: among the analysed countries it is possible to find countries which are strong in both, one or neither group of indicators.

The following quantitative description of the Information Society is therefore divided into IST and ICT indicators. It is meant to be illustrative rather than offer a precise measurement. Much has already been said in scientific literature about the difficulty for gathering internationally comparable data in such areas. With time (and much effort on behalf of the National Statistics institutes!), this might improve, but as far as today, we'll have to satisfy our curiosity with the available.

The multiplicity of indicators also needs a word of explanation. While some of these indicators are correlated, their use is justified as they measure various aspects of the demand for IST or supply of ICT. Their presence and some redundancy help giving a more detailed and balanced picture of the level of development of the Information Society in the given country.

Finally, while one could wish so, these indicators cannot serve as a basis for an integrated benchmarking exercise. There is no available model aggregating and moderating those indicators in a relevant and valid way. At best, the observable trends and complementarities help us identifying countries which obviously are at the forefront of Information Society related changes.

The level of IST development will be illustrated with the help of the following indicators.

1. *ICT market value*: represents the total end user spending measured per capita, in relation to GDP and in total value. It shows the volume of the ICT market. The study also gives a division of the ICT market to communication technologies and information technologies.
2. *Fixed-line Access*: a view on total access measuring the degree of telecommunication penetration in the analysed countries.
3. *Number of personal computers per 100 of total population*: measures the technical capacities for access to Internet which is considered as the most representative activity of the IS up to now.
4. *Percentage of households online*: measures the extent of household sector access to the Internet.
5. *Number of total Internet users per 100 of total population*: captures the share of those who regularly use the Internet, home or elsewhere.
6. *Number of Internet hosts per 100 of total population*: shows the extent to which there is a demand for IST services in the household and enterprise sectors.

7. *Number of Public Access Points*: a complementary means of access that helps better understanding of the above indicators of access and use
8. *Costs of access to the Internet*: is measured by the relative costs for households to purchase a personal computer and by access prices to the Internet.
9. *The share of broadband access to total*: reflects the quality of access
10. *The Digital Divide Index*: measures how equally the population gets access to these products and services.

These IST indicators can be divided into three major groups. Some of them give a rough picture of the technical background, which allows the users access to information services. Other indicators show how far the society has been able to integrate the use of the Internet and the extent of usage of Internet services. The final group of indicators gives information about the conditions of access: its quality, its division between different groups of society and the costs paid by the users.

The report uses four indicators when it assesses the level of development of the ICT sector in New Member States and the Candidate Countries.

1. Share of ICT sector in total production.
2. Share of ICT sector in total exports.
3. Trade balance in ICTs: a related indicator which shows whether ICT production is only processing, or whether it has higher value-added content.
4. Share of the ICT sector in total employment.

In this chapter, these indicators are used to compare the position of the Candidate Countries and the New Member States with each other and with the EU-15 average. This gives an initial, though fragmented, view on their current state of development. Statistical series for each of the indicators is also presented to help us appreciate the development trends and their importance. In conclusion, additional qualitative data from the national monographs is introduced which helps to consolidate the view on each indicator.

These attempts at a quantitative approach to IS developments show both similarities with, and differences to, earlier attempts carried out by international organisations and benchmarking reports (*OECD, the World Bank, United Nations, eEurope+, etc.*). Among the similarities is the fact that some data from other recent analyses and databases were used to fill gaps in the unified data from the Country Monographs. Also, some of the indicators have already been used in other analyses and reports, though, in the case of the current report, the data are more recent and broader.

However, the data set covered both by the Synthesis Report and the Country Monographs have some unique features compared with earlier assessments. Firstly, the data presented in the 13 Country Monographs are unique as they cover all the New Member States and Candidate Countries. Secondly, the data cover a much larger variety of reliable sources than earlier reports, and try to incorporate the latest annually comparable information (2003) for all countries. Finally, there is a clear distinction, both at analytical and descriptive quantitative level, between ICT use and production.

**IIA: IST developments in the New Member States and Candidate Countries**

**1. The ICT market value**

*a. Methodological note*

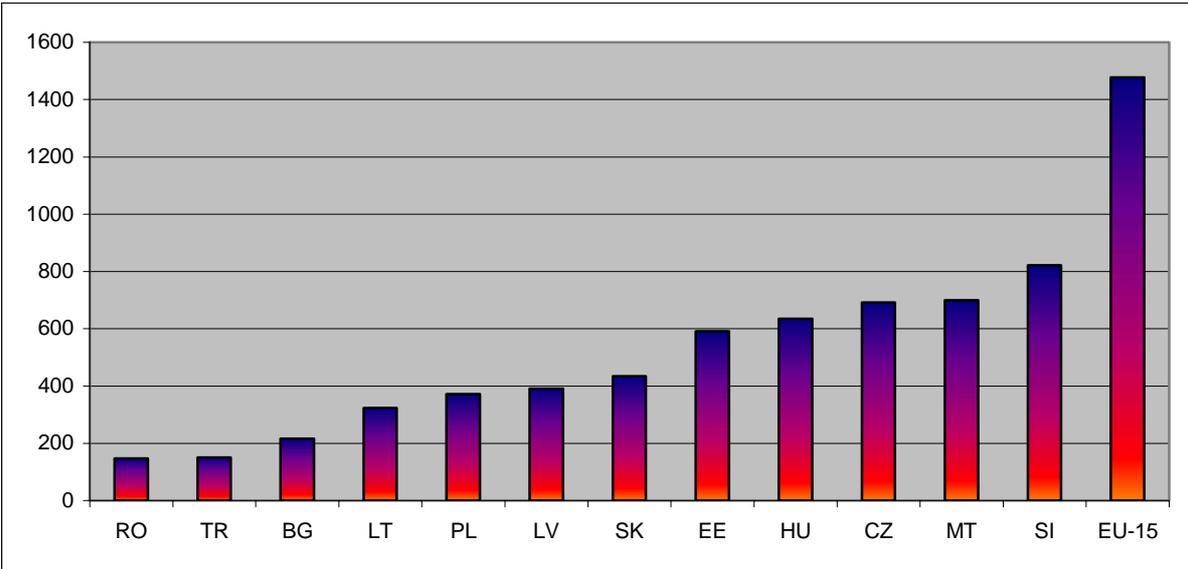
The ICT market value represents the end user spending on information and communication technologies. The data available in national currency units have been converted to Euro using the year end average exchange rate. Two indicators were used to assess the relative importance of ICT market value: ICT market value at current price per capita in Euro, and ICT market value relative to GDP at current market prices.

*b. Snapshot*

There is a considerable difference between the positions of the New Member States and Candidate Countries in relation to the EU-15 average, when using the two indicators of ICT market value. The level of ICT spending per capita has been considerably lower, both in absolute levels and as an average of the two country groups. The extent of the gap is reflected by the fact that the country with the highest value in per capita spending – Slovenia - exceeds only Portugal and Greece which have the lowest levels among the EU-15 countries.

The order of countries shows that higher income countries within the New Member State and the Candidate Country group had highest spending levels. All of them - except Estonia - have upper-middle income levels. The countries ranking lowest in ICT spending – Romania, Turkey and Bulgaria – have the lowest per capita income levels. The ranking of countries in terms of ICT spending therefore corresponded to income ranking. However, though this basic ranking is useful, it is insufficient, as it is contradicted by data provided by other indicators.

**Chart 13. ICT market value per capita in Euro, in 2003**



*Source: Eurostat 2003 and Country Monographs*

While the average and absolute levels of ICT spending per capita differ considerably between the New Member States and Candidate Countries and EU-15 countries, the variation within

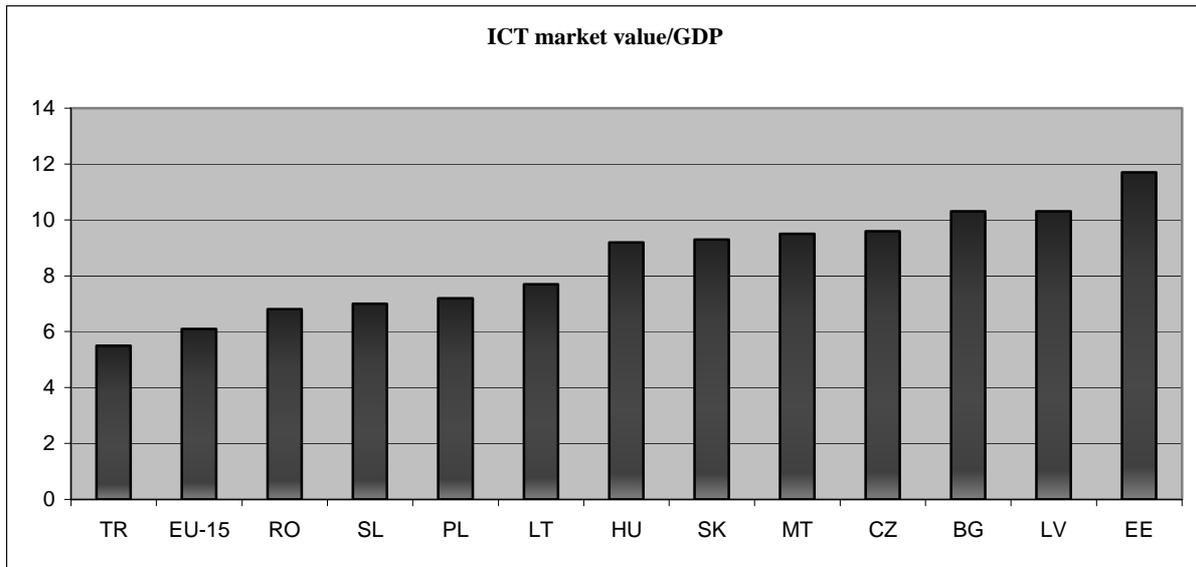
these two groups of countries is almost identical. Among the EU-15 countries per capita ICT spending in 2002 varied between 693€ in Greece to 2,390€ in Sweden, and this 1:4 relation was similar in the New Member States and Candidate Countries. Romania had the lowest level of ICT spending per capita (less than 200 €) and Slovenia the highest (almost 800 €).

Country ranking changes considerably when the market value is measured in relation to GDP. While the upper-middle income countries in the New Member State and Candidate Country group generally maintain their rankings (with the exception of Slovenia, which falls back considerably), the two lower income countries (Bulgaria and Lithuania) gain a much better position in ICT market value to GDP ratio than in the per capita one. Furthermore, only Turkey falls below the EU-15 average (6.1%), while the other countries exceed it. Finally, –as with EU-15 countries – the differences between the individual countries in terms of market value to GDP are much smaller than they are market value per capita (1:2 instead of 1:4).

Several closely related factors explain the differences in absolute levels and ranking of individual countries in case of these two alternative indicators. The main reason for the difference in ranking and relative position of the New Member States and Candidate Countries vis-à-vis the EU-15 lies in differences in income and ICT price convergence. Income levels - even when measured by Purchasing Power Standards - are much lower in these countries than in the EU-15. The same is true for price levels in general, but ICT prices have converged fast due to import liberalisation and the equalising effect of international trade. Sizeable differences in income levels coincide with small or no differences in price levels, which explains why spending (measured by market value) to GDP is much higher in the New Member States and Candidate Countries than the EU-15 average. This also explains why the lower income countries – such as Bulgaria or Latvia –achieve a much better ranking in the case of ICT market value to GDP than in per capita terms.

The differences in income and price convergence may also explain the sizeable gaps in ICT market value per capita levels. Similar to income convergence, wage convergence has also been relatively modest and generally below price and income convergence. As a result, per capita spending is much lower as the relationship between prices and disposable incomes available for ICT spending is less favourable in the New Member States and Candidate Countries than it is in the EU-15.

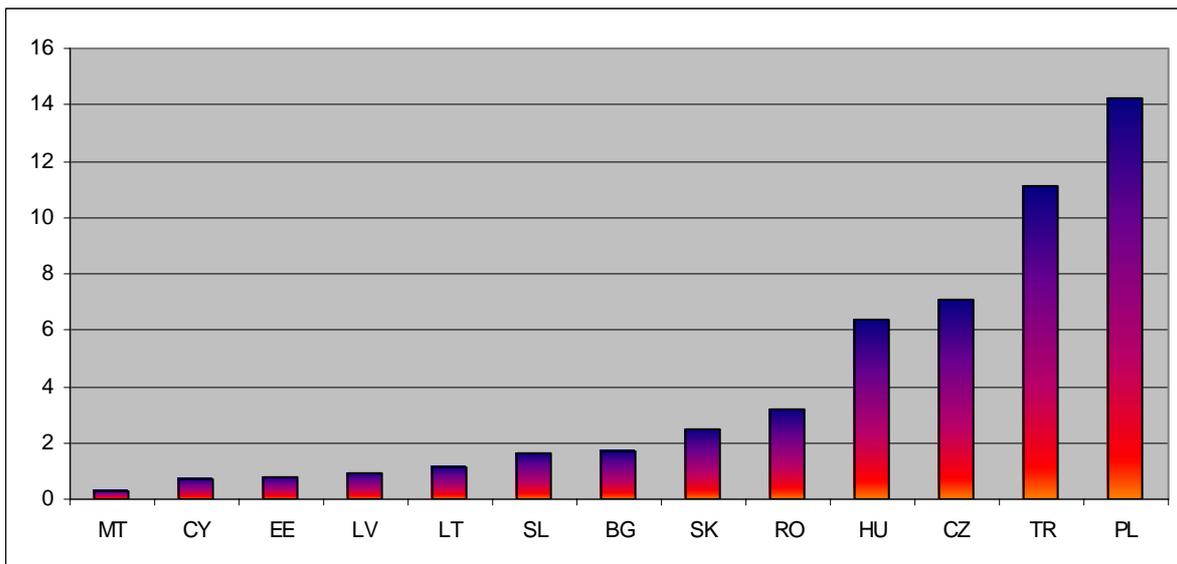
**Chart 14. ICT market value in % of GDP in 2003**



*Source: Eurostat 2003 and Country Monographs*

Looking at the size of the ICT markets in the individual countries, it can be noted that the population size of the country matters. The most populated countries (Poland and Turkey) have the biggest markets, notwithstanding the fact that their per capita and GDP related level of ICT market value is below that of the other countries. However, Romania – one of the larger countries - has a fairly small internal ICT market, and Slovenia – one of the smallest - has a market value equal to Bulgaria, though its population is four times smaller.

**Chart 15. The size of the ICT market in the New Member States and Candidate Countries, in billion € 2003**



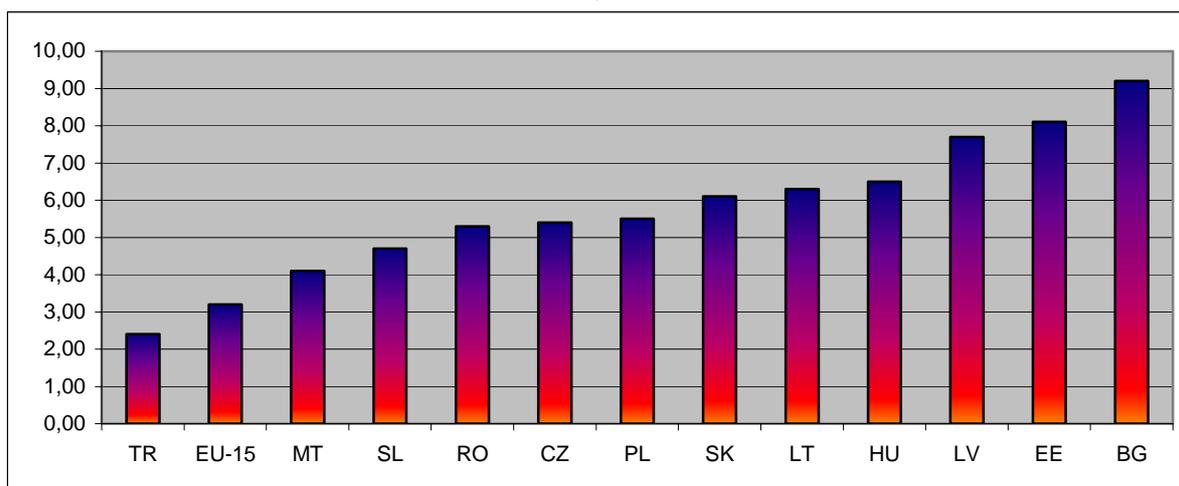
*Source: Country monographs*

When this snapshot picture of the ICT market is divided up into its component parts, an interesting picture emerges concerning the relative size and strength of the information technology (IT) and communications technology (CT) markets in the countries analysed. The

CT market rankings for some countries differ from their levels of IST development (to be presented later). Bulgaria and Latvia, for example, have much bigger CT markets than would be expected from their income level and other IST indicators.

On the other hand, Slovenia and the Czech Republic, which generally rank among the leading countries, are relatively far back in the CT market ranking. This is especially true of Slovenia, where the size of the CT market is only 4.5% of GDP. These differences between the individual countries are linked to special features of their local markets, and have less to do with their general level of IST development.

**Chart 16. The size of communication technologies measured by their contribution to GDP, 2003.**



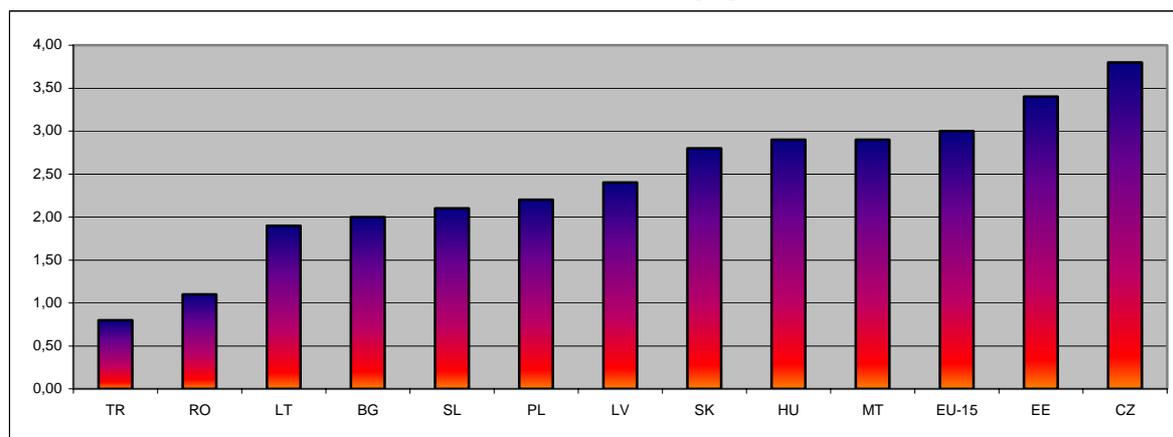
*Source: Country Monographs*

The information technology market is generally smaller than the communications technology market in all New Member States and Candidate Countries. Country ranking in IT market value is linked more with their traditional rankings in IST and ICT indicators and their level of economic development in general.

This ranking is led by the higher income Czech Republic, Hungary and Slovenia and Estonia, which have a much better level of IST and ICT indicators, than would be justified by their income levels. The lowest ranking countries – all three Candidate Countries – are also those with the lowest income levels. The size of the IT market is a good indicator for later data showing the level of IST development in New Member States and Candidate Countries.

**Chart 17. The size of information technologies measured by their contribution to GDP, 2003.**

*Source: Country Monographs*

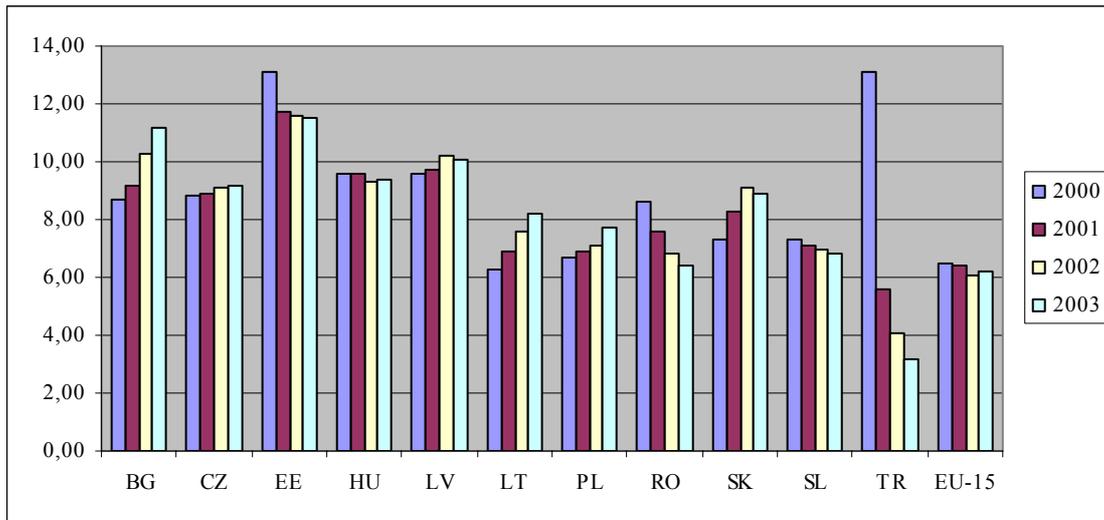


### *C. The dynamic picture*

The statistical time series of the indicator show that behind a general expansion of the ICT market, the dynamics in the individual countries vary considerably. In the three countries where ICT market value to GDP increased without interruption, the driving factors have been both the increase of disposable incomes and the expansion of corporate sector ICT related investments. The expansion of the market in Poland and Slovakia is closely linked to their recent privatisation-restructuring policies, as these were followed by significant increases in investments, which spilled over to ICT products. In the other countries, the market values were increased by the growing household spending, which was due to the increase of disposable incomes and government policies supporting the purchase of information and communication technologies (Hungary). In those countries which recorded declining levels of ICT market value to GDP, this was due to temporary saturation of market coinciding with fast expansion of GDP.

When looking at this dynamic picture, it should also be considered that these countries have had relatively favourable economic growth rates in recent years. Therefore even in cases where the ICT spending to GDP is stagnant, this may coincide with a significant increase in nominal volume and real value of the ICT markets. Hence, all the countries analysed have witnessed in recent years a sizeable expansion in ICT markets, driven by the increase of disposable incomes and greater emphasis put on ICT-related investments both by the corporate and household (and recently, also public) sectors. Moreover, when one compares the data back to 1998, most countries show levels 25-45% higher in 2003 than in 1998 - even those where the market value to GDP ratio stagnated or even declined in recent years.

This nominal and real expansion of the ICT markets should be considered when noting that the evolution of ICT markets in size to GDP has been different in the analysed countries. Some countries recorded sizeable increases in the level of their ICT market to GDP: the most notable cases were Lithuania, Poland and Slovakia. In the majority of countries, however, relative figures have stagnated in recent years. This holds especially true for Hungary, the Czech Republic and Latvia. However, two countries – among them Estonia, which had in relative terms the highest level – show a small decline in ICT market value to GDP.

**Chart 18. The evolution of ICT market value in some countries in % of GDP, 2000-2003**

Source: Eurostat 2003 and Country Monographs

## 2. Access path and fixed-line penetration rates

### a. Methodological note

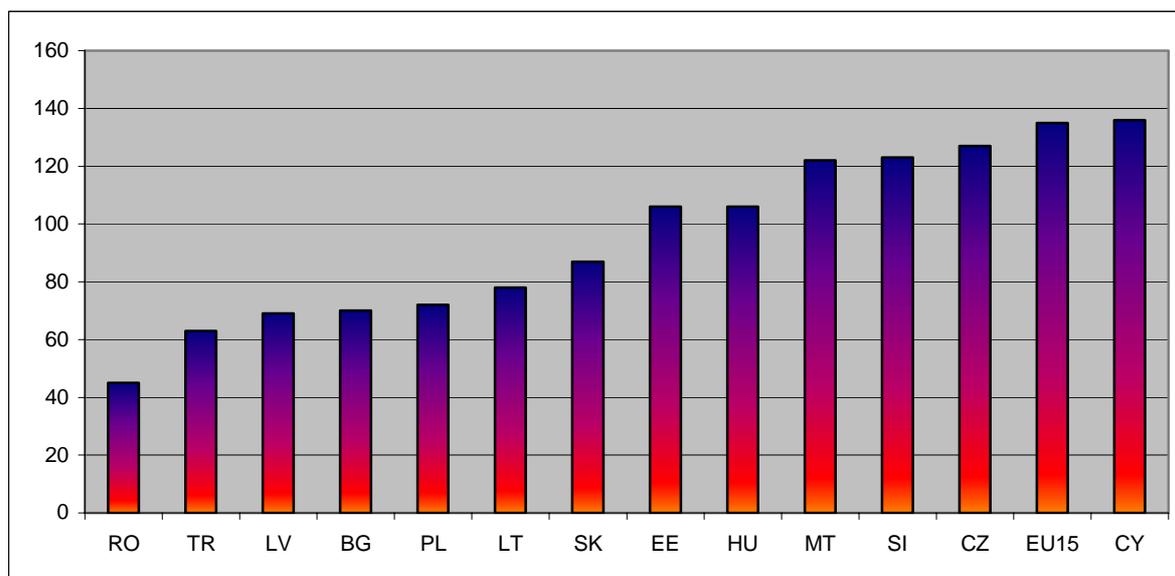
The access path reflects the cumulative number of fixed and mobile phone lines. This indicator illustrates indirectly the extent to which a society has access to communication services from a technical point of view. As fixed lines are the main channels to the Internet and related IS applications, several IST indicators hinge on their level. A separate presentation of fixed-line access is therefore also provided.

### b. A snapshot

Currently access paths in the New Member States and Candidate Countries are lower than in the EU-15 countries. In 2003, aggregated fixed and mobile lines resulted in a 135 per 100 inhabitant ratio in EU-15, while it varied between 45 and 125, with an average of 75, in the New Member States and Candidate Countries. Though current figures still show a considerable gap between the two groups, the gap has narrowed in recent years.

There are important differences in access rates among the New Member States and Candidate Countries themselves. With the exception of the Baltic States, this difference correlates strongly with the income differences between them. Three countries have access path rates close to the EU-15 average, while other countries' access path rates are much lower: this is especially true for the Candidate Countries and Poland.

**Chart 19. Access paths in the New Member States and Candidate Countries and EU-15 average, in 2003 in %**



Sources: Eurostat, 2003 and Country Monographs

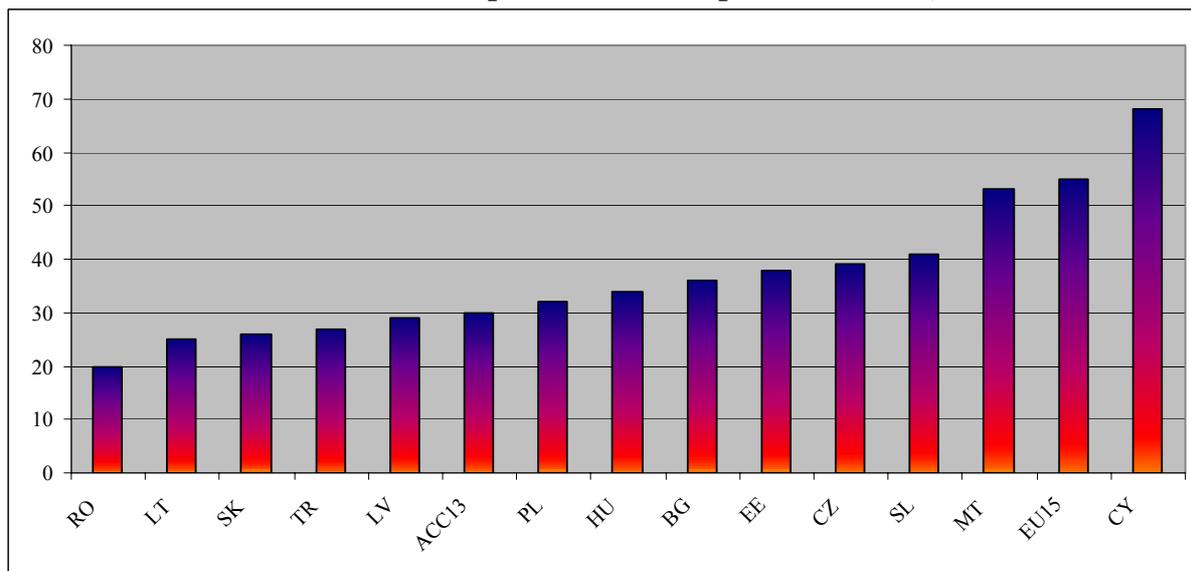
One structural characteristic contributes to the difference between New Member State and Candidate Country figures and the EU average: the access path is the result of *high* mobile and *much lower* fixed line penetration. This observation applies equally to those countries which privatised their incumbent operators “early” (Hungary, Estonia or Lithuania) and to those that postponed it (Czech Republic, Poland among others).

The next chart shows the fixed-line penetration rate per 100 citizens in 2003. As it represents all fixed-line subscriptions, it includes both the household and business sectors. The fixed-line penetration rate shows smaller variations than the access path, but the differences between the countries are still significant. The Czech Republic’s fixed-line penetration rate is more than double than that of Romania. Two groups of countries lead the ranking: the highest income ones (Malta, Cyprus), but also Estonia, the Czech Republic and Slovenia.

The differences in fixed-line penetration rates could be traced back to various factors. Firstly, heritage and general level of economic development is important. Some former transition countries have inherited better developed telephone systems from the former regimes (Slovenia and the Czech Republic), while others have not been so fortunate (Poland and Hungary).

Secondly, income level is an important explanatory variable as higher income countries (Cyprus, Malta and Slovenia) have higher penetration rates than lower income ones.<sup>15</sup> The differences also show the impact of telecommunication policies: countries that privatised quickly (Bulgaria and Hungary) reached higher penetration rates than the slower ones (Romania, Slovakia).

<sup>15</sup> But the differences in fixed-line penetration rates (with the exception of Romania) are smaller than in mobile penetration rates.

**Chart 20. Fixed-line penetration rate per 100 citizens, 2003**

Source: Country Monographs, 2003

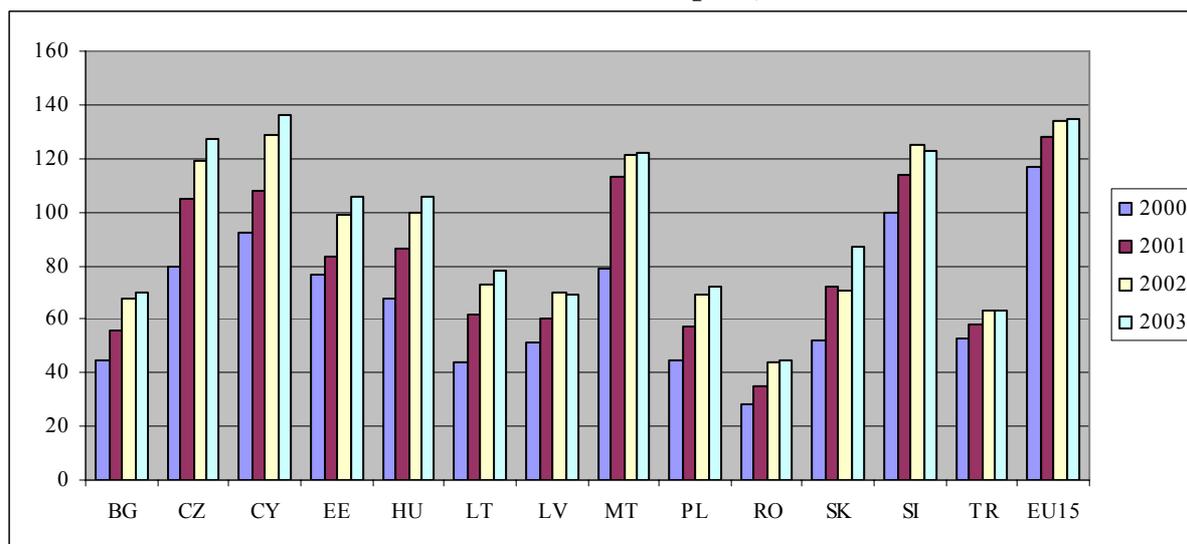
While penetration rates show country differences, quality of services matters too. In Malta the penetration rate is not only higher than in all the other countries except Cyprus, but almost 100 percent of these lines are capable of providing xDSL services. In the Czech Republic, Slovenia or Estonia this share is much lower. Equal penetration rates hide significant differences in technology and level of services.

There has been significant technical improvement in telecommunications services. Cyprus, the Czech Republic, Malta and Slovenia achieved complete digitalisation of their fixed line telecommunications system, while Hungary, Lithuania reached 90% digitalisation. In other countries progress has been more modest. In Bulgaria and Romania, the share of digitalised lines remains below 40% - forecast to reach 50% only by 2005.

### *c. The dynamic picture*

In recent years, access path rates have increased significantly from 2000 to 2003 in the 13 countries surveyed. This is equally true for the countries with lowest access path rates (Romania), and those with the highest (in 2000 and 2003). Growth has been accompanied by differentiated rhythms: Bulgaria, Hungary, and Slovakia have recorded below average, while Czech Republic above average expansion rates.

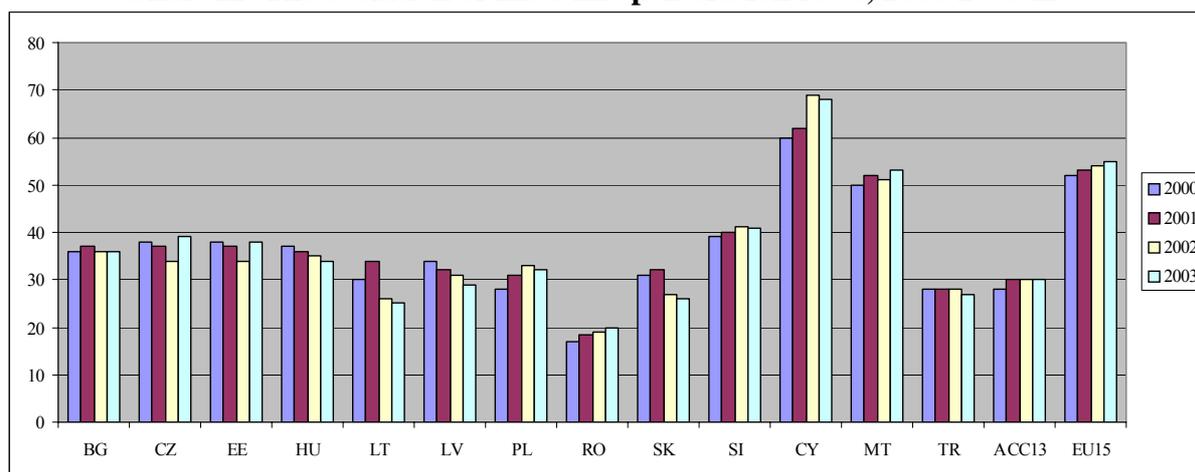
**Chart 21. The evolution of access path, 2000-2003 in %**



Source: Eurostat, 2003 and Country Monographs

These recent increases in access path in the New Member States and Candidate Countries have been driven largely by the growth of mobile penetration, while fixed-line penetration has increased much more slowly - in some countries, it has even stagnated. This reflects the trend in advanced countries with two differences: the decline of fixed-line penetration rates in the New Member States and Candidate Country group has been slightly stronger and it began from a lower starting point. Some of the reasons for this are similar to those given in advanced economies (portability, broader and more flexible services and applications of mobile connections), but others reflect specific New Member State and Candidate Country factors (much greater differences in quality between fixed and mobile services, faster declining charges, more competitive market structures in the case of mobile operators, etc.).

**Chart 22. The evolution of fixed-line penetration rates, 2000-2003 in %**



Source: Eurostat, 2003 and Country Monographs

This weak evolution of fixed-line penetration in the New Member States and Candidate Countries has certain implications. Mobile and fixed-line communication channels are not fully substitutive. Access paths to the Internet may have been weakened as fixed lines lost ground, and new mobile access technologies have not developed rapidly or reached the market. More funding from local and external sources should be spent on fixed-line

improvements. Alternatively, public initiatives aimed at reaching further rise in fixed line penetration rates (even with public sector financial support) could be provided.

### 3. Number of PCs in total population

#### a. Methodological note

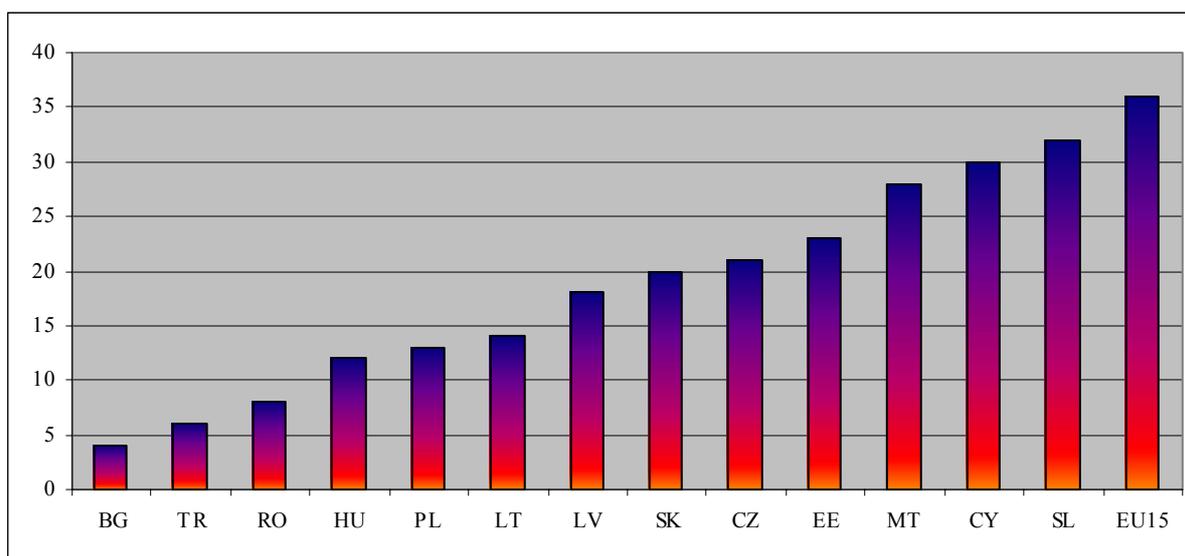
The number of personal computers per 100 inhabitants illustrates the spread of the major technical instrument to access IS services. The indicator shows the number of personal computers available for the total population, and it is a raw indicator as it does not show the differences in the quality of computers, neither their connectivity potential<sup>16</sup>.

#### b. Snapshot

Contrary to access path and especially mobile penetration, the gaps in PC penetration rates between the New Member States and Candidate Countries and EU-15 are much higher and have been growing in recent years. Even in the two countries with the highest PC availability (Cyprus and Slovenia) the gap with the average of EU-15 remains significant. The use of PCs in the New Member States and Candidate Countries is again strongly correlated with the income level, the analysed 13 countries can be divided into three groups.

The lower income countries (Romania, Bulgaria and Turkey) have the lowest penetration rates of personal computers, while middle income Central European countries and the two smaller Baltic States have medium level of PC penetration oscillating around 10 per 100 inhabitants. Finally, the higher income countries (Cyprus, Slovenia and also Malta) but also Estonia, have the highest penetration rates in personal computers.

**Chart 23. The number of personal computers per 100 inhabitants, 2003**



Source: Eurostat, 2003 and Country Monographs

Various factors explain the low level of computer penetration compared with the EU-15. The affordability and the price of computers seems to be the major factor as, in relative terms,

<sup>16</sup> Although it can be assumed that differences in the level of indicator are positively correlated with the quality of computers used.

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(purchasing power and relative to disposable incomes) computers are more expensive in the New Member States and Candidate Countries than in EU-15. Secondly, in the case of the household sector, there is a vicious circle as regards services available online and the number of personal computers used by the population. As eServices are relatively underdeveloped, potential users do not appreciate the usefulness of computers and are less willing to buy them. Thirdly, this backwardness has not been counteracted by public policies, which until recently have not been directed at increasing the affordability of PCs. Governments have rarely used tax incentives, favourable credit, depreciation treatments or alternative fiscal measures that could have reduced the access costs to PCs. While the personal computer market has been fairly competitive and prices have generally followed global trends with some delay, the gross income gap has been too big to allow PC acquisition to catch up.

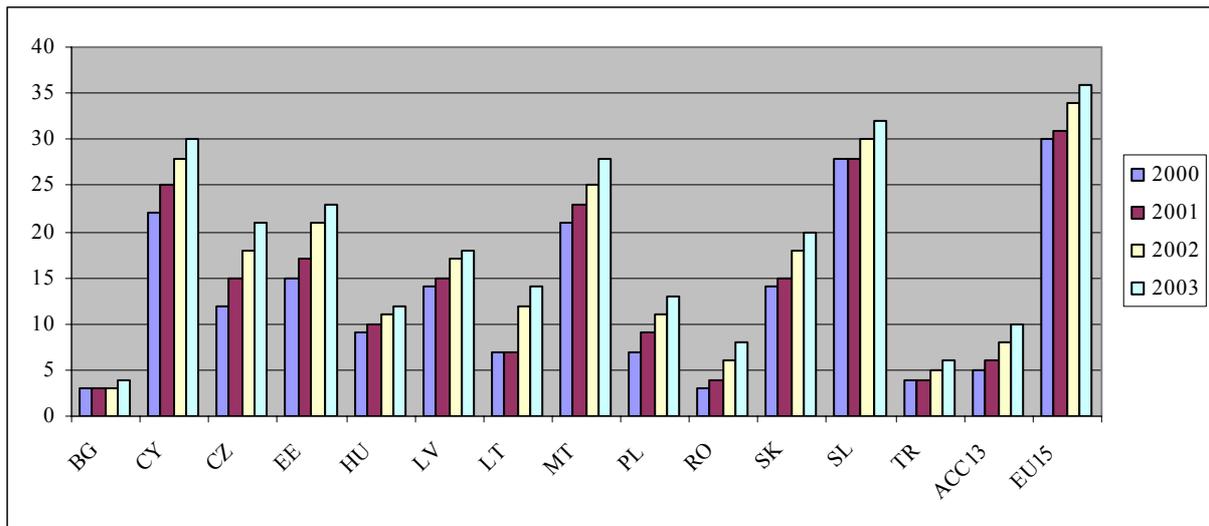
*c. The dynamic picture*

PC penetration rates have increased in all the New Member States and Candidate Countries in recent years. As a result Cyprus, Malta and Slovenia have PC penetration rates close to the EU-15 average. However, most of the 13 countries analysed continue to have considerably lower PC penetration rates and the gap between the averages for the New Member States and Candidate Countries and EU-15 has not always declined in recent years.

Where the number of computers has increased, this has been a very gradual process. Recently Estonia and Slovakia have recorded an above average growth of PCs in households, while Hungary, Lithuania, Poland and Slovenia experienced only a slight increase. PC penetration rates have stagnated in the remaining countries.

These recent dynamics support some conclusions concerning PC penetration rates. Firstly, the overall gap between the EU-15 and the New Member States and Candidate Countries is not closing necessarily. In some cases it might even be widening. Secondly, income convergence and further decline of computer prices (thanks to open markets and competition) may improve their affordability and may generate additional demand for them. However, governments could better support this process with tax credits, more attractive depreciation rules and any other fiscal policy measures that would stimulate the purchase of PCs. Finally, critical levels in available services, and a standard of high quality should be reached to reduce fixed costs and increase the attractiveness of PCs in ways similar to the mobile phone market.

**Chart 24. The number of personal computers per 100 citizens, 2000-2003**



Source: Eurostat, 2003 and Country Monographs

**4. Internet access in the household sector**

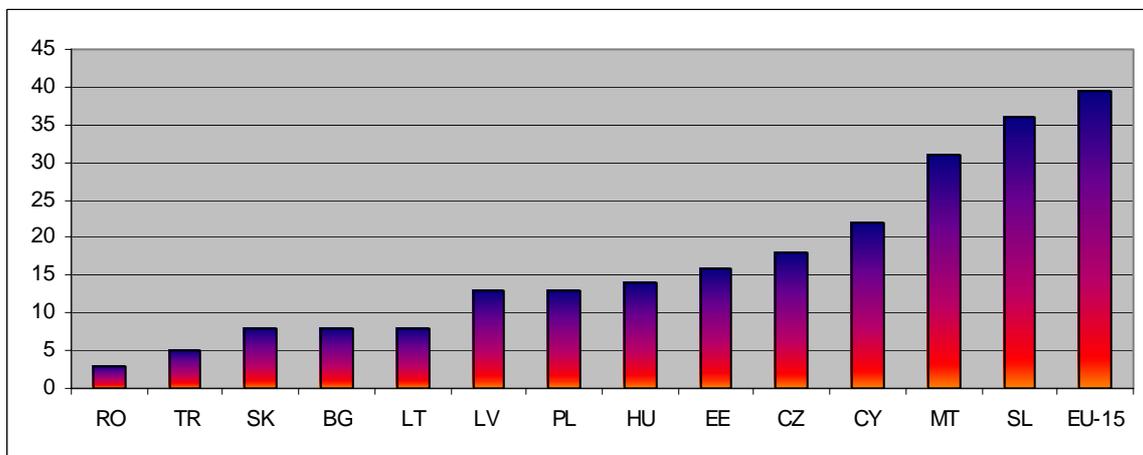
*a. Methodological note*

This indicator aims to capture the percentage of households that have access to the Internet. The figure does not discriminate between the various forms of connection which include cable networks, broadband or traditional phone lines. Therefore, it cannot give a qualitative differentiation between the countries analysed.

*b. Snapshot*

The share of households having Internet access at home is lower in the New Member States and Candidate Countries than in the EU-15. Only Slovenia and Malta crossed the 30% threshold. The Czech Republic, Estonia and Cyprus have shares approaching one fifth of the households sector. Many countries remain under or around the 10% mark.

**Chart 25. Households online in percentage of total, 2003**



Source: Eurostat, 2003 and Country Monographs

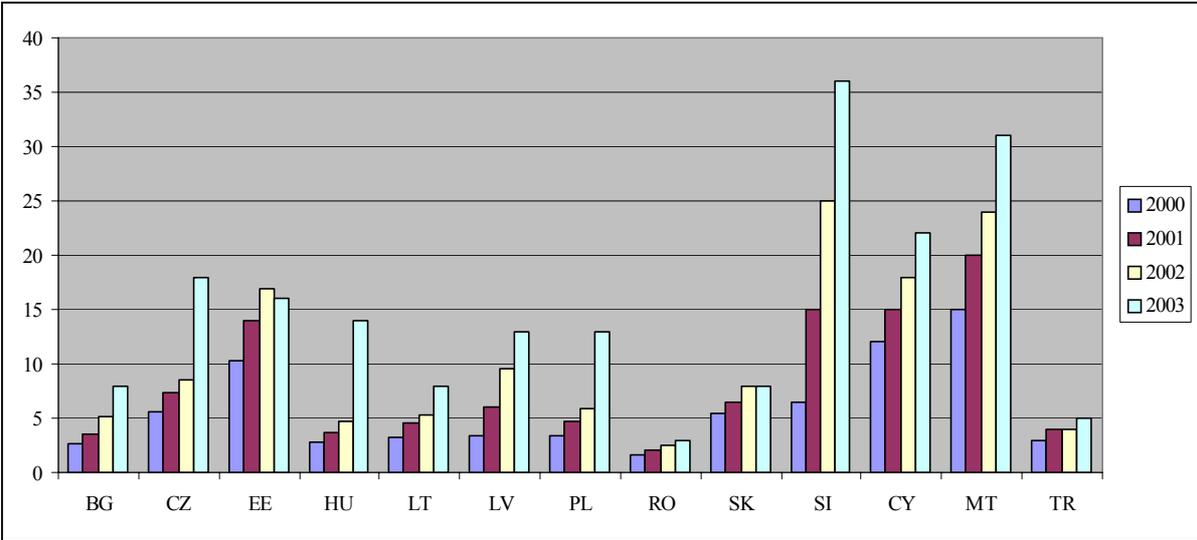
This strikingly low number of households online in the New Member States may be explained by the low income factor, the relatively underdeveloped level of eServices, and the cost factor of Internet access (price of Internet access, price of phone calls and also of computers). Such problems are magnified by income differences in the case of Romania, Bulgaria and Turkey, which explains their very low levels of household Internet access.

There is a strong correlation between the percentage of online households and the relative level of development measured by per capita GDP. On the other hand, there is also a strong correlation between the number of households online and the level of fixed-line penetration rates: countries with higher levels of fixed-line penetration have the highest share of household sector connected to the Internet. Finally, there is also a strong correlation between the number of PCs as a percentage of population and the share of households connected to the Internet, notwithstanding the fact that many of those who are connected access the Internet from Public Access Points or other places.

*c. The dynamic picture*

While the static picture is rather negative and shows significant gaps with the EU-15, the dynamic analysis presents a steady growth in the number of households connected online to the Internet in the New Member States and Candidate Countries. The growth rates have been significant over recent years, albeit from low starting levels. There was an especially significant increase in penetration rates in 2003 in most of countries, particularly in the Czech Republic, Hungary, Poland, Slovenia and Malta. This was due to several factors including robust income growth, wider and more targeted government policies supporting access to the Internet, and slightly declining prices thanks to enhanced competition between the Internet and phone service providers. These same factors seem to lie behind the somewhat surprising decline of the level in Estonia and its stagnation in Slovakia (slow down of income growth in the former and less supportive and generous government policies in the latter).

**Chart 26. Households online, in percentage of total, 2000-2003**



*Source: Eurostat, 2003 and Country Monographs*

At the same time, the differences among the New Member States and Candidate Countries are growing as the two countries with considerably higher levels of Internet access by households (Slovenia, Malta and to lesser extent Cyprus) improve their rates faster than the other

countries. There is no sizeable difference in the growth rate of Central European and Southeast European countries in the sample. Some countries (like Hungary and Poland in 2003) show fast increases, while others (Romania, Turkey and Slovakia) have desperately low levels and rates of expansion.

## 5. Use of the Internet by the population

### a. Methodological note

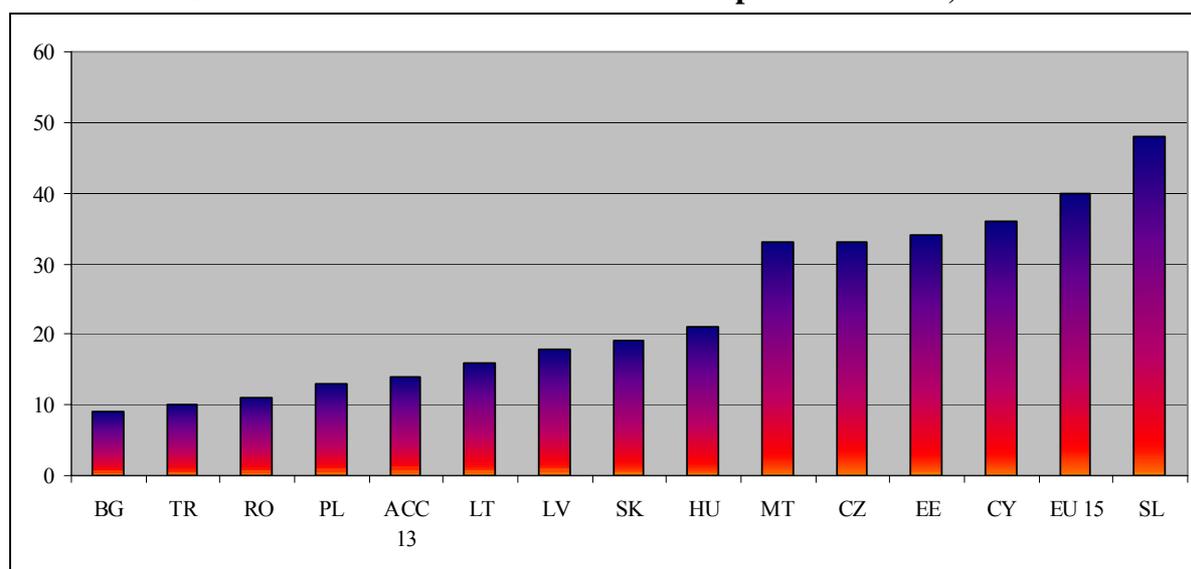
This indicator measures the proportion of the population that had access to the Internet in the 4 weeks prior to the measurement. This measurement does not take into account Internet users' access location (from office, home), the age group, or sex, etc. It offers an image of the total use of the Internet in a given country.

### b. Snapshot

The snapshot shows that there is again a considerable gap both between the average of New Member States and Candidate Countries and EU-15 countries, and also between the countries of the former group. The average number of Internet users in the EU-15 countries is 53%, with some of these countries having much higher shares of their population using the Internet. Still, the use of the Internet has been close to or above the EU-15 average in Slovenia and Cyprus. In Malta, the Czech Republic and Estonia it approaches the levels of the lowest ranking EU countries (Spain, Portugal). The share of Internet users in the total population in these New Member States exceeds 30%.

Concerning the differences between the New Member States and Candidate Countries themselves, the chart below illustrates that there is some correlation between the number of households connected to the Internet and the number of users. The countries that were ahead in household access are the ones that also lead this variable.

**Chart 27. The number of Internet users per 100 citizens, 2003.**



Source: Eurostat, 2003 and Country Monographs

In other accession economies (Lithuania, Latvia, Slovakia, Poland and Hungary) the share of population regularly using the Internet is much lower. These economies belong to the group

with a medium level of Internet users (around 15%), with Hungary and Slovakia being positioned slightly above other countries. In the South Eastern European countries the use of the Internet is very limited as the share of population regularly using it is around 10% - one fifth of the level observed in the EU-15.

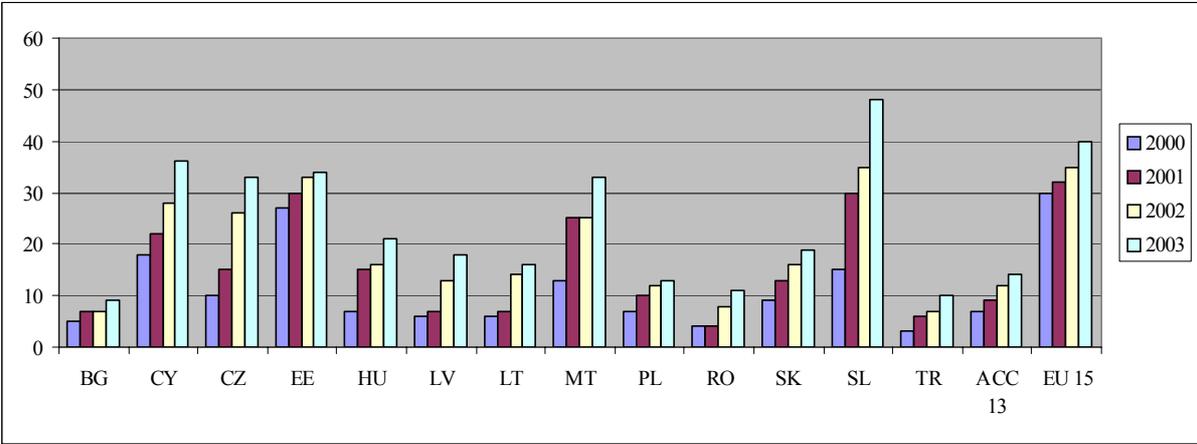
There are several factors that may explain the differences. Firstly, income gaps and differences in per capita GDP and disposable income matter strongly. In countries with higher income levels, Internet use is more affordable than in lower income ones. Secondly, this figure may be assumed to summarise the effect of various indicators (PC ownership and use, Internet access price, telephone penetration rates, etc.). Therefore it is not surprising that countries that generally perform better in the majority of these indicators are ahead in the Internet use by population, while those that lag behind in one or more have lower shares of population using the Internet.

*c. The dynamic picture*

The difference between the EU-15 and the New Member States and Candidate Countries has not changed significantly as both country groups have recorded similar rates of growth.

Among the New Member States and Candidate Countries, the leading countries grow faster, with Slovenia, Malta and Cyprus being the leaders. At the other end of the scale, the number of Internet users has been growing relatively gradually in Bulgaria, Hungary and Lithuania, - in sharp contrast with the former group.

**Chart 28. The number of Internet users per 100 citizens, 2000-2003**



Source: Eurostat, 2003 and Country Monographs

The dynamic picture and the snapshot both show that there is ample opportunity for the New Member States and Candidate Countries to increase the share of population with access to the Internet, especially in narrowing the gap between them and EU-15 average. The dynamic analysis also shows that many countries have started to experience significant increases in the usage indicators. When threshold levels are reached, growth rates may accelerate further.

While these threshold levels will be country specific, they be similar to the levels observed in the case of mobile penetration. In the latter case, when market penetration reached 40-45%, the market started to expand extremely fast, driven both by demand and supply side factors. Much higher penetration rates were quickly reached. Something similar may happen in the

case of Internet penetration, which requires these threshold levels to produce spill-over effects that favour faster expansion.

## 6. Number of Internet hosts

### *a. Methodological note*

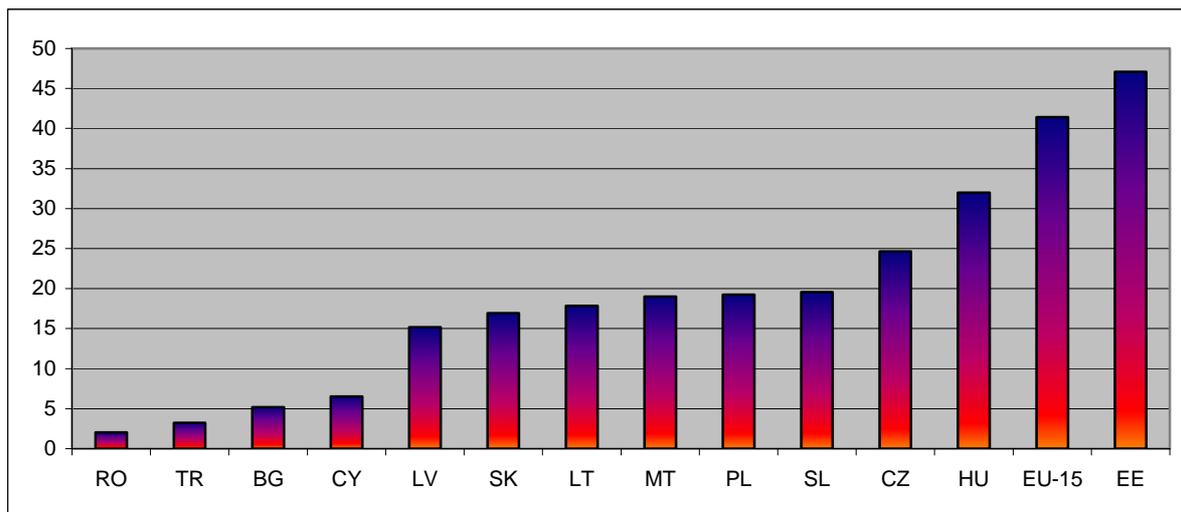
This indicator measures the number of registered Internet hosts per 1,000 inhabitants. It gives an impression of the diversity and extent of online information and services provided in the individual countries. It aims to grasp digital content-related development but it has two major shortcomings.

Methodologically speaking, as with the other indicators, this figure does not reflect the extent and quality of services provided by Internet hosts. It does not reflect precisely the number of services available because the ease with which domains can be registered varies from country to country. In this regard, Estonian legislation has been very liberal until recently. Secondly, it measures only domains with country extensions, which includes more generic servers such as .edu, .com or .int, which may be expected to be supplied in an unequal distribution between the analysed countries, biasing thus the indicators. Still, it is readily available, and gives a complementary view on IS developments in a given country.

### *b. Snapshot*

Estonia leads the New Member States and Candidate Countries as its number of Internet hosts per 1,000 inhabitants exceeds even the EU-15 average. Hungary and the Czech Republic follow, with around 25-30 hosts per 1,000 inhabitant. A relatively homogenous group of other New Member States come next, with around 15 Internet hosts per 1,000 of population. Hungary is slightly ahead and Malta is slightly behind their usual rankings. The Candidate Countries, which have already been ranked low in terms of various other IS developments, come last.

**Chart 29. The number of Internet hosts/1,000 people, 2003**



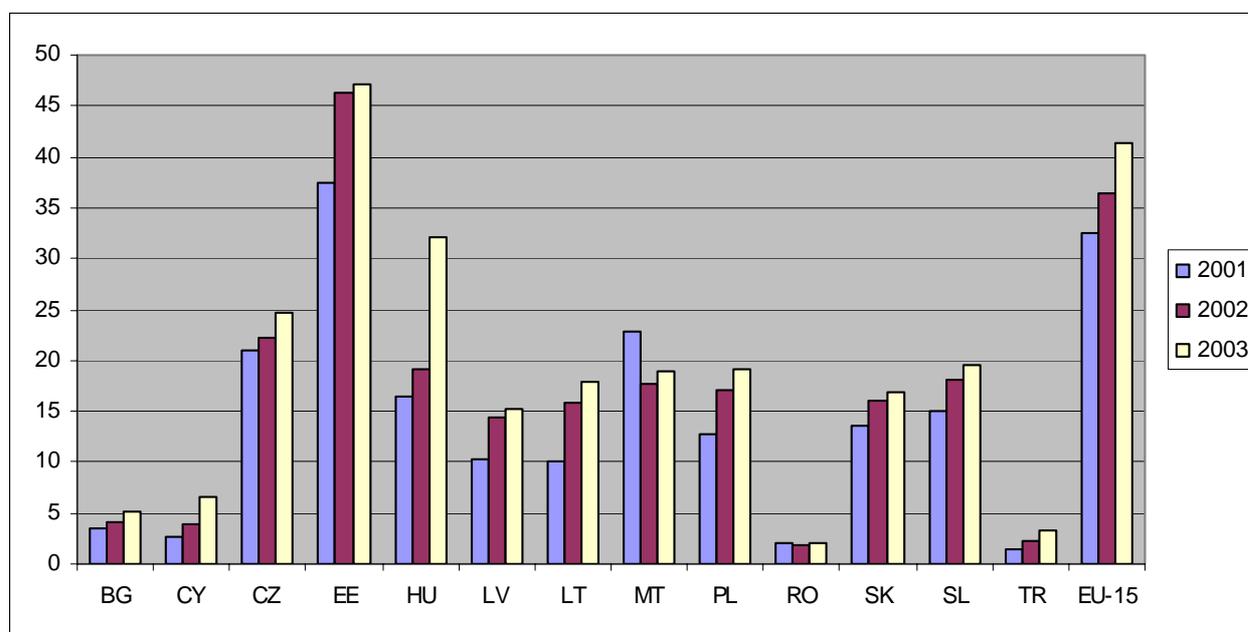
*Source: Eurostat, 2003 and Country Monographs*

### c. The dynamic picture

The dynamic picture reveals sizeable differences between the New Member States and Candidate Countries. The leading countries (Estonia, Hungary and the Czech Republic) have recorded the fastest increase in the number of Internet hosts. Some countries have recorded almost unchanged relative figures: the slow dynamics of Cyprus, Romania, Bulgaria and Turkey are consistent with their absolute ranking among the 13 countries analysed. The remaining countries, which were ranked lower according to their 2003 figures, have experienced fast increases in the number of Internet hosts over recent years: the best examples are Lithuania, Poland and Slovakia.

In absolute terms, only the Polish figures for Internet hosts (around 750,000) are of comparable size with the figures for the majority of current EU member states. In other countries, the figures are much smaller in absolute terms – barely exceeding 50,000. The Czech Republic and Hungary are the exceptions and are experiencing fast increases in the number of Internet hosts. So too is Turkey – albeit to a much smaller extent.

**Chart 30. The evolution of Internet hosts between 2001 and 2003 in thousand**



Source: Eurostat, 2003 and Country Monographs

## 7. Public Access Points

### a. Methodological note

This indicator shows how many Public Internet Access Points are available per 1,000 citizens. Public Access Points are an important means of access to the Internet and IS services wherever they are established, but especially in less developed areas and certain strata of societies. These include, among others, the younger generations who widely use PAPs,<sup>17</sup> people who are less able to afford Internet access costs, and also people living in less

<sup>17</sup> This explains the fast spread and popularity of Internet cafes in many of the countries analysed. Other Public Access Points, popular in these countries, are public libraries, which have been established even in the smallest towns and villages and which allow access to Internet.

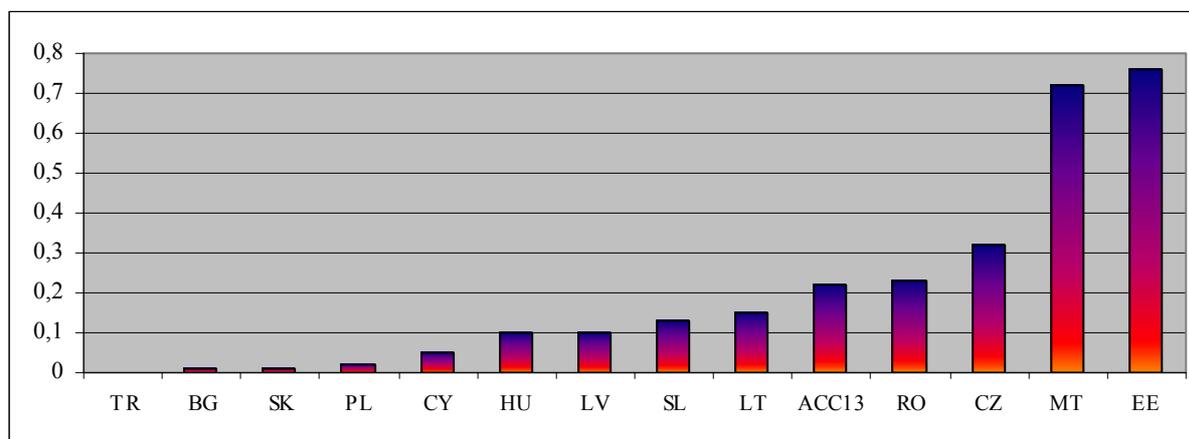
developed areas (though there the use of the Internet and Information Society services is also generally more limited). Comparable figures for people using PAPs are not available across these countries.

The data makes no distinction between different forms of public access (Free or charged, open 24/7 or on restricted schedules, etc.) and focuses only on the absolute numbers. Rather than measuring IS development, this indicator indirectly shows part of the public effort to encourage use by the population of a given country. Along with intermediary data, it also completes the picture on Internet access and use.

### *b. Snapshot*

The number of Public Access Points in each New Member State or Candidate Country varies considerably. Estonia has 72 times more PAPs per 1,000 inhabitants than Bulgaria. The spread of Public Access Points shows the importance attached to their development by governments. In Estonia, Malta, the Czech Republic and especially in Romania (which has a lower income), their spread was the result of deliberate policy actions aimed at supporting their establishment and broader use. Governments in these countries spent significant budgetary resources to develop Public Access Points, and also paid more attention to other measures indirectly promoting the spread of Public Access Points, including promotion of eGovernment services and provision of better eContent.

**Chart 31. Number of Public Access Points (Units / 1000 inhabitants) in 2003**

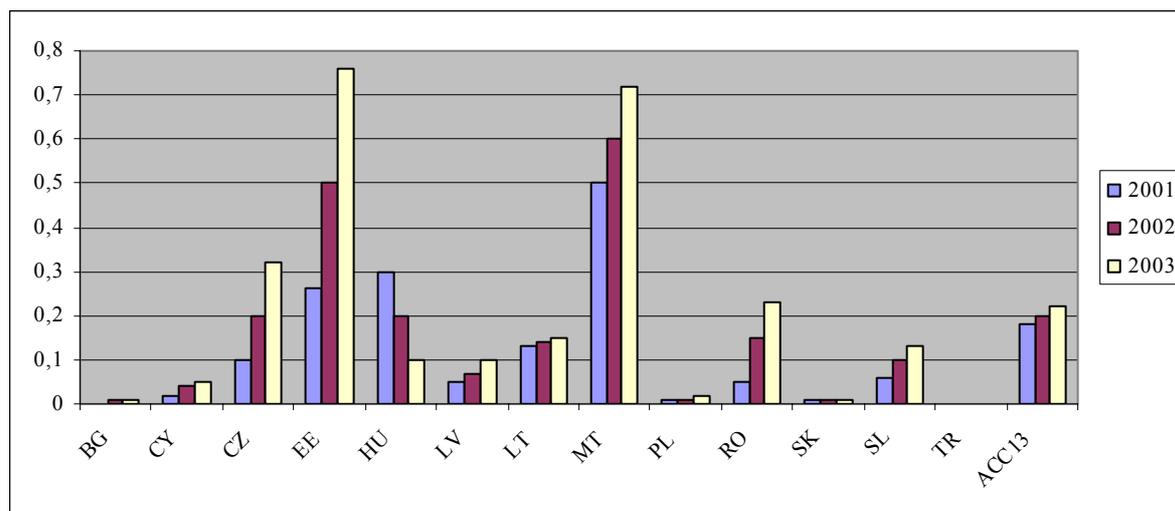


*Source: Eurostat, 2003 and Country Monographs*

### *c. The dynamic picture*

The evolution of PAP distribution reflects the same differences shown in the 2003 snapshot. The countries which started with higher levels of Public Access Points have experienced fast expansion over the last three years. Their relative number tripled in the Czech Republic, Estonia and Romania, and in Malta it increased by 50%. In those countries which were below the New Member States and Candidate Countries average in 2003, development has been much slower or has even reversed. The low number of access points remained almost unchanged in Bulgaria, Cyprus, Poland and Slovakia, while they have even declined in Hungary. This mixed speed of spread explains why in the New Member States and Candidate Countries the average number of Public Access Points remains around 0.2 per 1,000 citizens.

**Chart 32. The changes in the number of Public Access Points, 2001 - 2003 (Units / 1000 inhabitants)**



Source: Eurostat, 2003 and Country Monographs

## 8. ISDN and broadband access

### a. Methodological note

Broadband allows fast access to the Internet and is a key priority for European IS development. Broadband is a relatively new phenomenon in the New Member States and Candidate Countries. ISDN has therefore been selected as a relevant benchmark for broadband availability. Other means of fast access exist but are still very limited in these countries.

In more advanced countries, however, ISDN has already lost ground to alternative and faster technologies (ADSL, cable and wireless connections, etc.). In the EU-15, ISDN is an outgoing technology, while in the majority of the New Member States and Candidate Countries it is still an important improvement compared with earlier connection technologies. This explains why the EU average might appear to be low compared with some New Member States and Candidate Countries. The case of Germany is revealing in this respect as its 47% ISDN use is accompanied by 21% ADSL, 13% cable modem and 16% wireless use.

ISDN allows 64 kilobits/sec access for users. The figures below show the number of ISDN subscriptions per thousand citizens in the New Member States and Candidate Countries as compared with the EU-15 average.

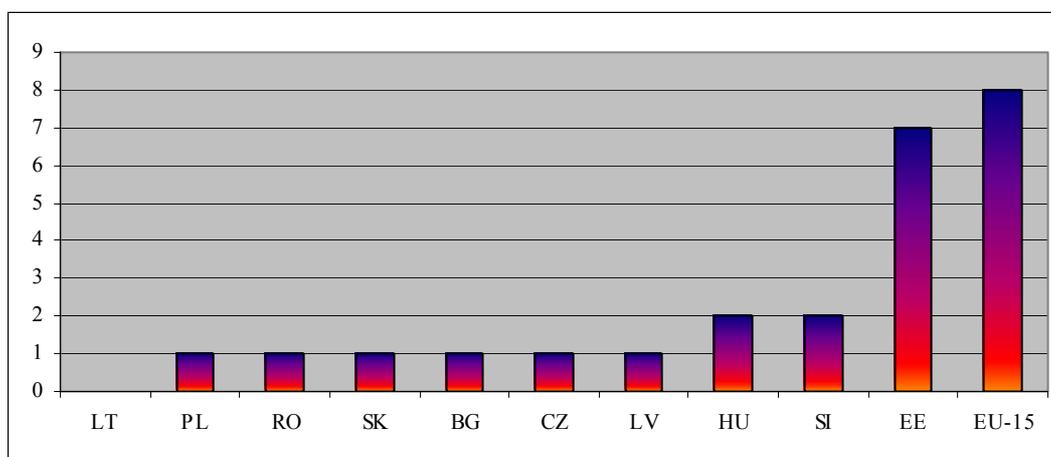
### b. Snapshot

All the New Member States and Candidate Countries perform rather weakly in broadband access, with the notable exception of Estonia. The average share of broadband access in the EU-15 in 2002 was 13%: only Estonia came close to this with 8%, while the other New Member States and Candidate Countries achieved levels below 2%.

The existing technologies which provide access to broadband are outdated and require significant investment for upgrading. Broadband development has been restricted to copper telephone networks using ADSL technology, and cable TV networks using cable modems,

while other forms (fixed wireless access, third-generation mobile systems, and satellite among others) are still non-existent.

**Chart 33. Broadband connection as a % of total, 2002**



*Source: Eurostat, 2003 and Country Monographs*

Both supply side and demand factors explain the low figures for broadband access. Firstly, the technical capacity and development of broadband is a recent development even in the EU-15 and much more so in the New Member States and Candidate Countries. The resources so far have been devoted to other essential telecommunication investments and less has been spent on broadband access. Moreover, neither the government nor the private sector has invested sufficiently in broadband applications. At the same time, in remote and sparsely inhabited areas it is still not profitable to establish broadband access and government policies that make up for the lack of private capital are either missing or remain insufficient.

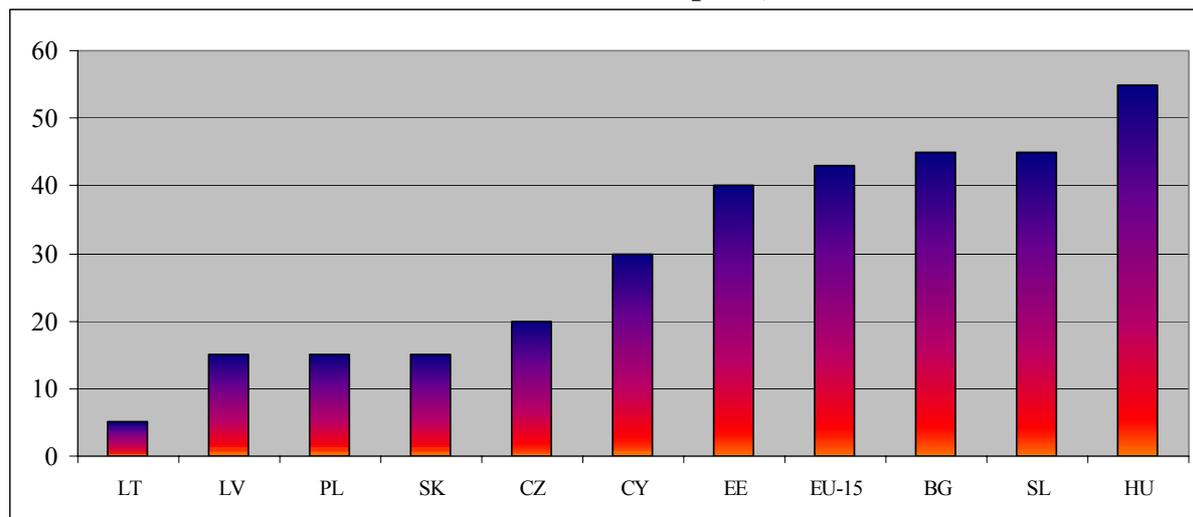
Secondly, access prices (introduction costs, monthly phone and access charges) compared to consumer purchasing power are too high, which reduces the affordability of broadband. Only recently have government policies devoted more attention to broadband issues and have more actively supported private and public initiatives to increase broadband use.

Even considering the methodological problems of making comparisons with the EU-15 countries, it should be recognised that several New Member States and Candidate Countries have performed relatively well in the international arena. The high level of ISDN lines in Hungary, Estonia and Slovenia does not come as a surprise as these countries have generally the best IS indicators (with the notable exception of Hungary).

On the other hand, Bulgaria's leading position does come as a surprise, especially if its relative level of development and position in the other indicators is considered. Bulgaria has performed extremely well with ISDN line subscriptions and exceeded most of the New Member States and Candidate Countries. As regards the other countries (where data were available and comparable), it comes as another surprise that both the Czech Republic and Slovakia had low levels.<sup>18</sup>

<sup>18</sup> This is partly due to the low level of broadband access and partly to the fact that other than ISDN technologies developed faster in these two countries.

**Chart 34. The number of ISDN lines per 1,000 citizens in 2002**



*Source: Eurostat, 2003 and Country Monographs*

Bulgaria, the Czech Republic and Hungary have almost tripled the number of ISDN subscriptions. The number has also increased fast in Cyprus, albeit from a lower starting point.

## **9. Internet access prices**

### *a. Methodological note*

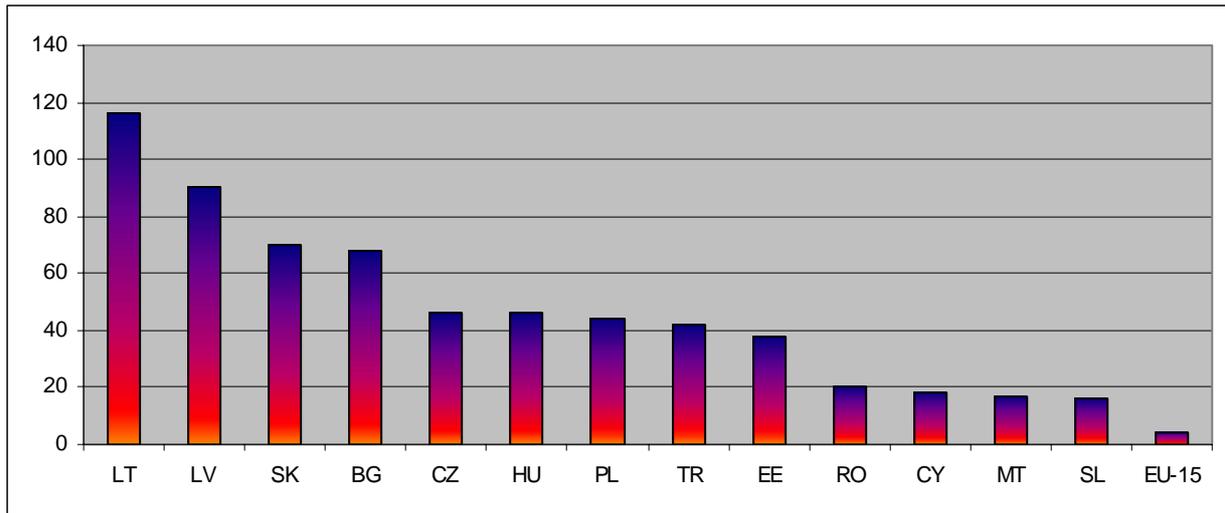
An important indicator that helps us understand the spread of IST is related to the cost of Internet access and use. Three indicators of the affordability of IST services are proposed: Internet access costs, dial-up costs and PC purchasing costs. Firstly, in order to compare the price of access in relative terms, monthly Internet access prices in individual countries were converted to Euro on PPS determined exchange rate level. The measure used was the 40 hours off peak time Internet access cost. However, as the main cost item is not access to Internet services but dial up costs, they were also compared across countries. The indicator used was the 20 hours peak dial up costs as a percentage of the available disposable income of households. The third indicator calculates the relative costs of purchasing an average quality PC by a household as a percentage of total household income.

### *b. Snapshot*

Looking at the charts, the ranking of individual countries differs from indicator to indicator, but there are several common trends. First, the leaders in all three indicators are Cyprus, Malta and Slovenia, as the relative costs of Internet access, dial-up costs and PC purchase in PPS adjusted level and relative to household income are the lowest. On the other hand Latvia, Lithuania, Bulgaria, Slovakia and Romania have in general higher rates in those indicators. There are several factors that might account for the significant differences, for example, income levels of individual countries and market structures, and the extent of competition on the telecommunications and Internet service market. With the exception of Slovakia, these costs reflect indirect (tax concession, etc.) or direct government support, mainly for the purchase of personal computers.

In the case of Internet access costs for 40 hours off peak time PSTN usage, the differences in charges between Slovenia (the leader) and Latvia (the last) are one to six. The differences reflect two factors. First, income differences matter: countries on the right side of the chart are the highest income countries with the exception of Romania, while ones on the lower end of the chart are the lowest ones, with the exception of Slovakia. Second, differences are also explained by the extent of market competition, and the presence of alternatives to the incumbent operator service providers.

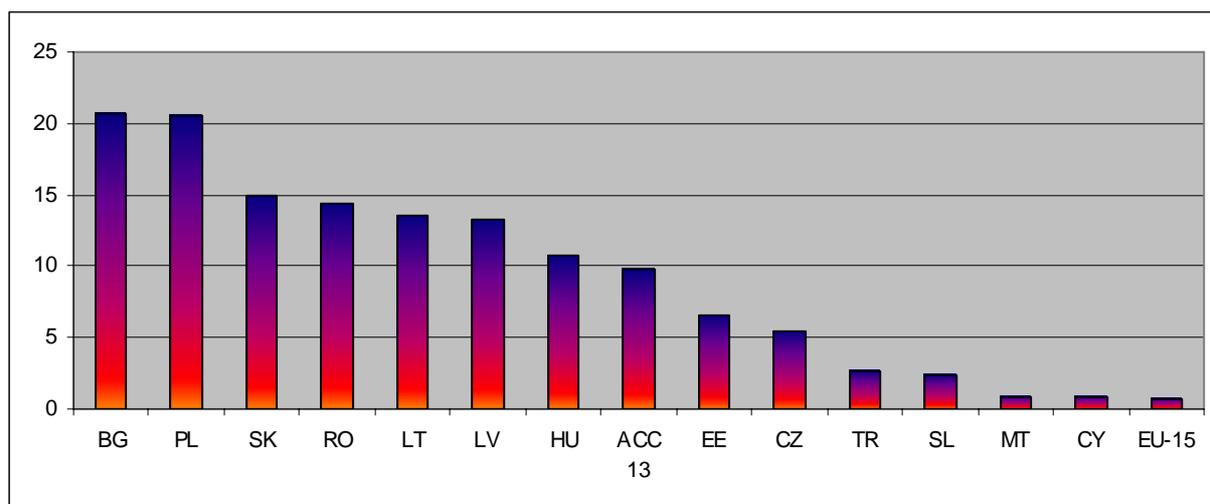
**Chart 35. Internet access costs measured by 40 hours off peak time, PSTN usage in PPP adjusted € in 2003**



*Source: Eurostat, 2003 and Country Monographs*

In the case of dial up costs, the factors behind the differences between the countries are quite similar to the previous one. One of them is the gap in per capita GDP income between Cyprus/Malta/Slovenia and the other countries. The differences in dial up costs are more important than those in income levels: market competition is also a factor. Countries which have the highest dial up charges still have either strong monopolistic incumbent operators or have not benefited from their sale: prices and quality differences reflect missed opportunities in telecommunication policies.

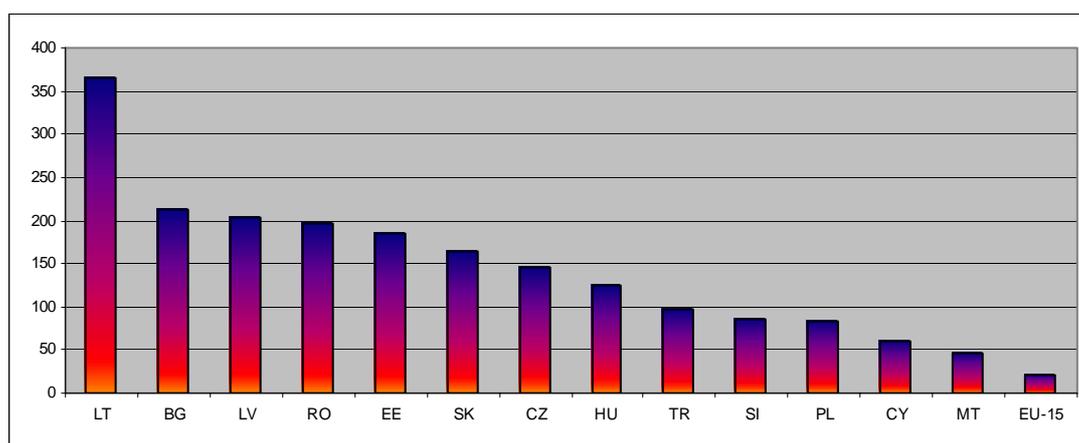
**Chart 36. 20 hours peak dial up costs as % of household income in 2003**



*Source: Eurostat, 2003 and Country Monographs*

The purchase cost of personal computers (by households) reflects the same income differences: there is a reverse correlation between income level and the relative costs of a PC in terms of household income. In high income Cyprus and Slovenia, households need to spend “only” 5 to 7 times less of their income than in the lower income Baltic or South-Eastern European countries. Still, in countries with lower incomes, such as Poland and Turkey, purchase costs are relatively smaller than in medium income countries (Slovakia, Hungary, and Czech Republic): market structure and size also matter. The good position of Poland and Turkey has to do with the size of their internal markets, which are the biggest ones in the New Member States and Candidate Countries. Their markets give much better prospects for corporations to reap scale effect from local production.

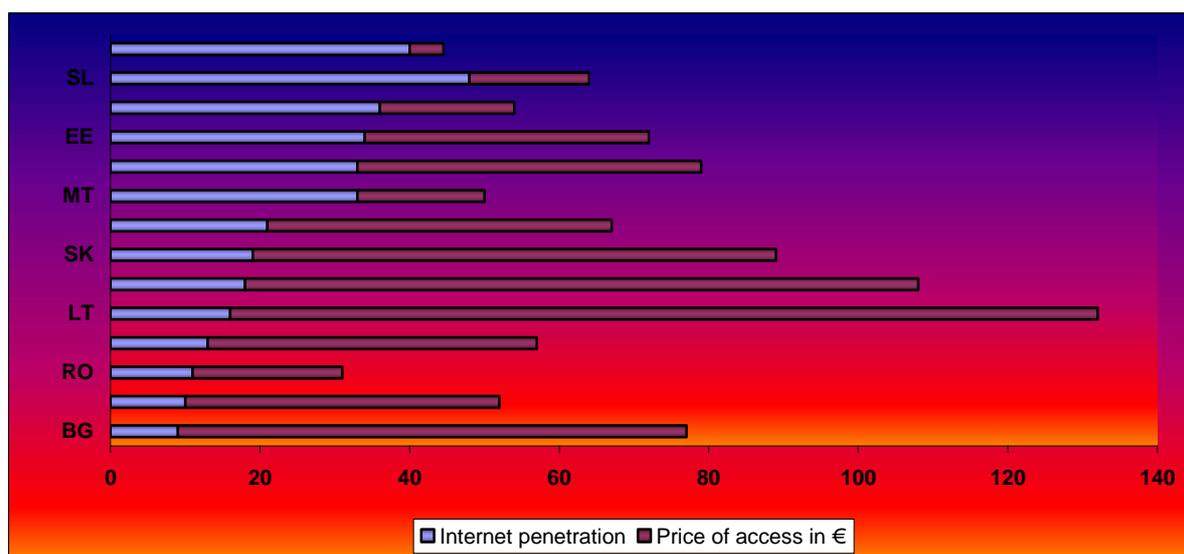
**Chart 37. Cost of a PC as % of household income**



*Source: Eurostat, 2003 and Country Monographs*

The high absolute and relative prices of purchase and access could be one of the impediments to the evolution of IST in the 13 countries analysed. The chart below shows that there is some correlation between Internet penetration rates and price of Internet access. The same would be true if instead of the 40 hours peak Internet access the other two indicators – relative costs of PCs and of dial up connection for households – were plotted against the penetration rates.

**Chart 38. The link between access price and Internet penetration rates in the New Member States and Candidate Countries, based on 2003 data**



Source: Eurostat, 2003 and Country Monographs

But the extent of this problem and the impact of tariff structure depend on the source of relatively high prices. The impact on IS developments is completely different if the problem is caused by price convergence or if the tariffs are the outcome of regulation failures and/or loopholes. In many cases, it is true that prices are too high to allow broad affordability of these services, and neither market competition nor government regulation and direct policy measures seem to be sufficient to improve the affordability of these services.

## 10. Digital Divide

### *a. Methodological note*

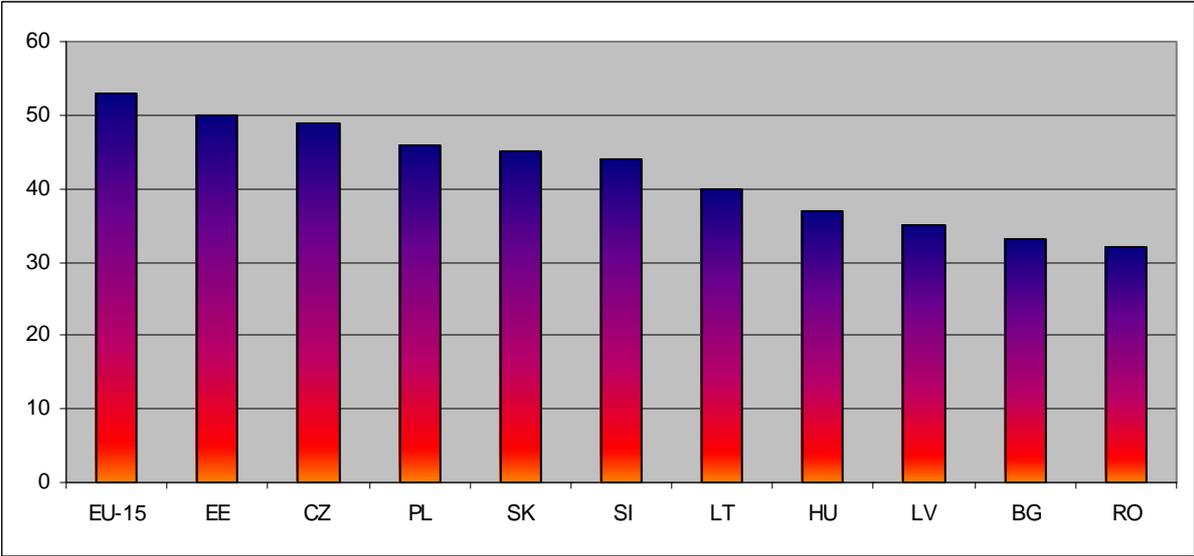
The Digital Divide Index developed by Empirica, a research institute based in Germany, is a compound index comprised of four indices, measuring diffusion of computer and Internet access, and the use amongst four “risk” groups in relation to the population average. The four risk groups measure the impact of gender, age, and income and education level on Digital Divide in the countries analysed. The weight of each of these individual factors is a country specific factor, but their aggregate value gives a fairly good approximation of the level of digital divide in the individual countries, if one accepts the premise that the Index is built exclusively upon demand-side aspects, neglecting the supply-side ones - such as infrastructure availability - and their obvious complementary effects on use. The lower the Index value, the more severe the divide is, with equality resulting at the value of 100.

### *b. Snapshot*

According to available data for the EU-15 countries, digital divide has been declining, albeit very slowly. This has to do with the different evolution of the components of the index: while age and gender-based digital divide had been decreasing, the education-based divide increased and there was almost no change in income-based digital divide.

The chart shows that while the digital divide is higher in the New Member States and Candidate Countries than in the EU-15, the differences are not substantial on average. Digital divide indices among the leading New Member States (Estonia, Czech Republic, Slovenia, Slovakia) are better than in the worst performing EU-15 Member States.

**Chart 39. The Digital Divide Index for the New Member States and Candidate Countries**



Source: SIBIS report (2003)

On the other hand, the composition of this index differs slightly from the EU-15 average, as the gender gap is narrower, while the other three indicators have a higher value and bigger impact on the equality of access to digital services. The biggest inequalities emerge from the education gap, which shows that people with low education levels are especially likely to be excluded from the Information Society. Income gaps also have a strong impact which is understandable due to the short-term uneven effect of transition related economic and social changes in 10 out of the 13 countries analysed.

In relation to this— though not measured explicitly in the Digital Divide Index - the digital divide in these countries is also linked to stronger social and regional divides.

**11. IST indicators: a cumulative conclusion**

The above tables and charts present a selective overview of the state of IST indicators in the New Member States and Candidate Countries. Though there are sizeable differences among the countries analysed, the data presented above allow us to draw several conclusions concerning the overall level of IST development in these countries.

First, the data confirm that the New Member States and Candidate Countries lag considerably behind the EU-15 countries in most IST indicators, both on average and, in most cases, individually. The gaps, however, are different. In the case of certain indicators (like overall access path and fixed-line penetration rates, or digital divide), the gaps are relatively small, but in the majority of the analysed indicators they are quite significant, though very country specific. The ranking of the individual countries in terms of their level of IST development closely follows two factors: their overall level of development (i.e. GDP) and the attention

paid by governments to providing and supporting access to Information Society services through a variety of measures and channels.

Second, the dynamic analysis in the case of most indicators illustrates that the existing gaps have not narrowed between the EU-15 and the New Member States and Candidate Countries in recent years, but widened due to several factors. One is certainly the difference in affordability of these services, which is strongly linked to the income differences between EU-15 Member States and the New Member States and Candidate Countries. Besides the private sector, the approach of governments mattered too as in the EU-15 – with significant country differences – governments have spent more resources and devoted much more attention to the development of the demand side for IST than in the New Member States and Candidate Countries.

Third, the figures reflect significant differences between the New Member States and Candidate Countries: some of them are ahead of the majority and the average of the accession countries in IST indicators. Six countries can be easily identified as being at the forefront of the IS developments: Czech Republic, Estonia, Hungary, Malta, Slovakia, and to a lesser extent Cyprus. The seven remaining countries lag slightly behind, usually in several indicators.

Fourth, the gaps between the New Member States and Candidate Countries and EU-15 are sometimes critical and point to policy areas of high importance – for example, the low level of household PC use and, in general, the high access prices (especially compared to disposable household income and purchasing power standards), and the low share of broadband access. The differences and especially the trends between the New Member States and Candidate Countries and EU-15 in these areas raise the possibility of widening gaps unless the trends are reversed and the New Member States and Candidate Countries are able to catch up in these areas. This is especially so, if it is considered that the differences in indicators were able to reflect only statistical but not qualitative differences. But quantitative differences hide also qualitative ones in terms of the computers used, the density of PAPs, and speed and quality of broadband access. The qualitative differences magnify the existing quantitative ones, and put the New Member States and Candidate Countries in an even more backward position.

Fifth, there is a close link between the individual indicators in many cases. The level of prices of access to Internet services, phone calls and computers is positively correlated with Internet penetration rates. The extent of fixed-line penetration is also linked to Internet access showing a strong positive relationship between them. The close relationship is due to two factors: on the one hand these indicators have a cross influence on each other and on the other hand they are affected by similar independent variables.

Sixth, while the 2003 figures reflect significant and sometimes widening gaps, time series data show several positive developments in the New Member States and Candidate Countries. Among them, the speed of expansion of both the use and supply of IST has significantly increased in recent years. In most accession countries, there has been an accelerated increase of penetration rates and other IST access figures. Moreover, the still low levels of IST consumption, investment and output have been rising faster lately than in the second half of 1990s. Recently, governments have devoted more attention to this sector than they did in the late 1990s and this may improve indicators in the short-term.

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Seventh, there are differences in the use of information and communication technologies by the business, household and public sectors. In general, it is more limited than in EU-15 countries. The business sector uses it less for everyday commercial activity due to a vicious circle of lower demand for such services. The private sector has much lower access to ICTs due to the income gaps and affordability problems described, and public sector use is also more constrained due to public finance problems. This more limited use is demonstrated by the differences in the number of host services provided by existing web sites, and by the availability of online services in the private and public sectors.

Finally, some examples show that in certain areas it is possible for the New Member States and Candidate Countries to leapfrog ahead, despite their underlying economic conditions. Fast catch up in several areas is not unlikely, provided competitive market conditions and well designed policy measures are implemented. The increase of mobile penetration rates, the level of Internet use by the population show that very fast quantitative and qualitative developments may occur in these countries too, provided – as described later, especially in Chapter V - the right, committed policies are put in place and the available resources are fully utilised.

## **II.B. ICT indicators in the New Member States and Candidate Countries**

This section presents the state of development of four sector-related indicators in order to give a brief insight into the production side of ICT in New Member States and Candidate Countries. The following indicators are described:

1. ICT sector share in production
2. ICT share in exports
3. Trade balance in the ICT sector
4. ICT share in employment

These ICT indicators are presented in a similar way as those related to the use, or demand side (IST). First, their absolute level is presented and compared to the EU-15 average. Second, a brief approach to the statistical series helps us to assess the direction and the importance of the trend. In conclusion, additional qualitative views from the national monographs are introduced to consolidate the view on the ICT sector.

### **1. The share of ICT sector in output**

#### *a. Methodological note*

The share of ICT sector production in the domestic economy is appreciated by comparing the contribution of ICT industries (manufacturing and services, including telecommunication services) to the total output of the economy (GDP).<sup>19</sup>

#### *b. Snapshot*

Five of the New Member States and Candidate Countries - Malta, Hungary, Estonia, Slovenia, Bulgaria, and Hungary - have ICT-producing sectors which contribute more

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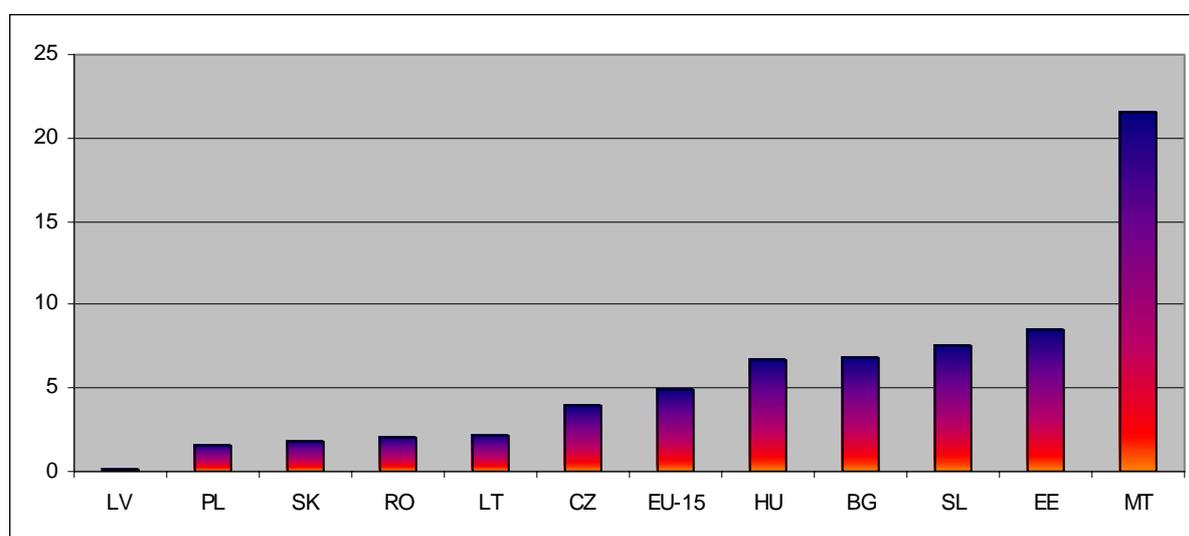
<sup>19</sup> The ICT sector is measured based on the NACE classification from data available in internationally comparable national sources.

strongly to their national economies than the EU-15 countries on average. However, it should be noted that some countries within the EU-15, such as Denmark, Greece or Portugal, have very small ICT-producing sectors, which reduces the level of the EU-15 ICT sector average contribution.

These five countries have high shares of ICT in production for a variety of reasons. In Malta, Estonia and Hungary, this is mainly due to the rapid penetration of foreign firms. In Slovenia and Bulgaria, it is associated with structural changes in industrial production, due to the presence of relatively strong (and partly domestic) software-producing companies.

The share of ICT sector production of the New Member States and Candidate Countries in their domestic economies shows wide variation (see Chart 40 below) of between 1.3% and 22.5% of GDP. Both these extremes are represented by small countries, Latvia and Malta.

**Chart 40. The share of ICT sectors in GDP in % in 2003**



*Source: Eurostat and Country Monographs*

In the remaining New Member States and Candidate Countries, the ICT sector represents a much smaller share of total output. In Latvia, Slovakia, Poland, Romania and Lithuania, its relative weight is of a little relevance in the national economy. These countries either did not have the required level and diversification of industrial production, and/or have followed a more conservative approach to privatisation and FDI. However, Poland and Slovakia which have followed open policies towards FDI and had better than average human and physical capital supply indicators, developed (small) ICT production sectors. They have been able to modernise their sectors with the help of a recent surge in capital inflows. Romania may be the next country to follow as it has experienced a recent boom in FDI. As it has kept wages at a competitive level, it may thus expect an increase in the scope of its ICT sector. In the Czech Republic, the share of ICT sector is below the level of manufacturing development of the country. This may reflect two related factors: most of the industry is represented by small and medium-sized enterprises and the privatisation started here later than in Hungary or Estonia.

Some qualitative statements can be made about the nature of ICT production in the New Member States and Candidate Countries. First, in the most populated countries there is room for a few domestic-owned companies to compete with major multinational players, both on the global and domestic markets. This is especially true of Poland and Turkey, where several

locally-owned companies maintained their production and were able to withstand competitive pressures and stay on the market, unlike local producers in other, mainly smaller, countries.

Secondly, in some of the other countries there is a room for domestic, mainly foreign owned companies to serve the global market and to focus their activity mainly on exports (Hungary, Estonia and Malta are the best examples). Besides the insufficient size of the domestic market, the main reason for such a strategy is the competitive advantages these countries have against other countries specialising on export sales due to cost, quality of factor supply and institutional and structural heritage.

Finally, in the majority of countries (but mainly in those which have higher value-added producers, above average skilled labour forces, and strong connections with international companies, etc.) there is room for niche market domestic-based multinationals, serving the global market and also supplying the local one. This relates mainly to ICT services and certain labour intensive software products. This is equally true for countries that have already embarked on this kind of specialisation (Slovenia) and others, which have a broader spectrum of product supply.

**2. The contribution of the ICT sector to exports**

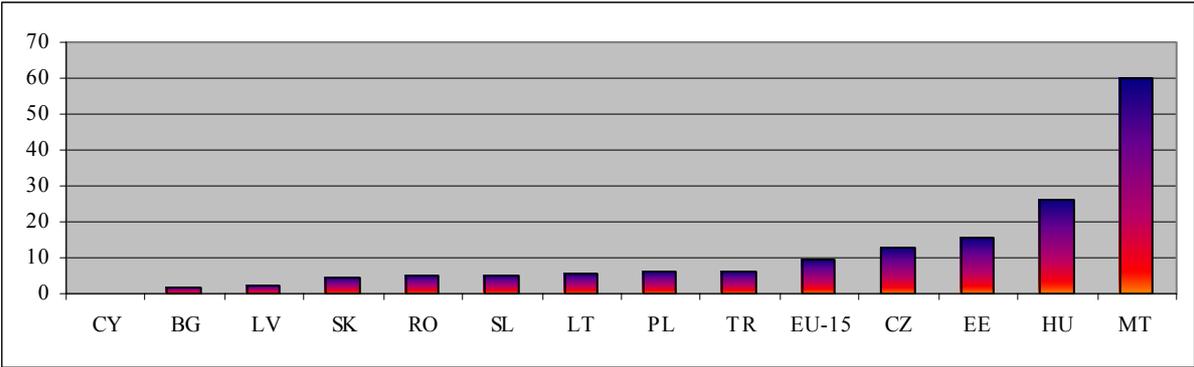
*a. Methodological note*

This indicator measures the share of ICT sector export against total exports of a given country. The sum of the various ICT-producing sub-sector export values are divided by the total export value of the country.

*b. Snapshot*

There are very important differences between countries in the contribution of their ICT sectors to exports. These differences reflect the size of the domestic economy and show for some of them the strongly outward oriented production and the variation in ICT output value.

**Chart 41. The contribution of ICT sectors to total exports in % in 2003**



*Source: Eurostat and Country Monographs*

The ICT sector represents an exceptionally high share (60%) of total export revenues in Malta, mainly due to the high level of production and export of a major multinational microprocessors producer. In three other countries, the share of the ICT sector in total exports exceeds the equivalent average figure of EU-15 countries. The ICT sector makes up 25% of

total export revenues for Hungary, 18% for Estonia and 12% for the Czech Republic.<sup>20</sup> All three countries are small, and have well established production and export capacities, as a result of foreign firms locating their production facilities in these countries to utilise their cost advantages and their supply of human capital.

In Malta, Hungary and Estonia, the ICT sector is mainly based on re-exporting activities and assembling ICT products, though recently the content and local added value have increased. These countries are increasingly experiencing inflow of foreign capital related to the establishment of R+D, marketing and logistics centres, which have increased the added value of ICT sector production. This has been slightly different in Slovenia, where exports are linked more to the software industry than to hardware production.

In the other New Member States, the ICT export share is much smaller: it varies between 1% (Latvia), and 9% (Czech Republic) of total sales.

### *c. The dynamic picture*

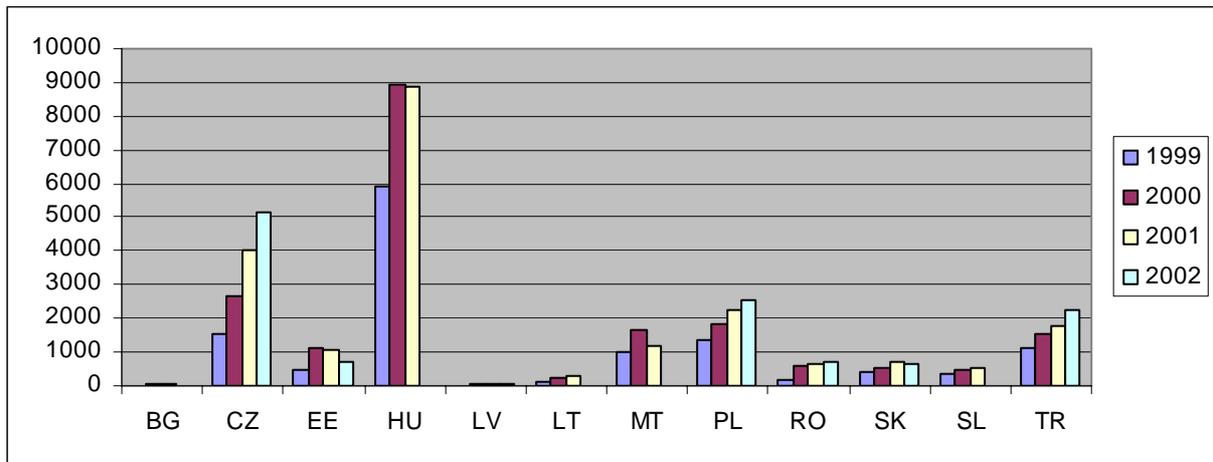
ICT exports are vulnerable to external shocks. Vulnerability means that exports and ICT production depends on the demand of major export markets and on changes in relative competitiveness vis-à-vis other major exporters. This is clearly seen from the dynamic picture, which shows the evolution of the annual value of ICT exports from 1999 till 2002. The collapse of the ICT boom at the beginning of this decade created serious export problems for the leading exporters (Malta, Estonia, Slovenia and Hungary), when the producers saw their market size diminishing fast. The changes in external demand resulted in stagnation of exports that earlier had increased very rapidly.

The chart also shows that, in absolute numbers, the Czech Republic and Hungary are the leading exporters of ICT products, with Poland lagging considerably behind. While in relative terms both Estonia and Malta seem to be leading countries, the level of their export sales is limited and therefore their absolute data are much smaller. Out of the New Member States and Candidate Countries only Hungary, the Czech Republic and, to a lesser extent, Poland and Turkey can be regarded as significant exporters on the international markets, while the others have much smaller capacities and export sectors.

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<sup>20</sup> In 2002 the share and ranking were different as the ICT sector made 29.1% of total exports in Hungary, 26.5% in Estonia and 16.6% in Slovenia, with the Czech Republic having 9.5% share.

**Chart 42. The annual value of ICT export in million Euro, 1999-2002**



Source: Eurostat 2003 and Country Monographs

### 3. The trade balance of the ICT sector

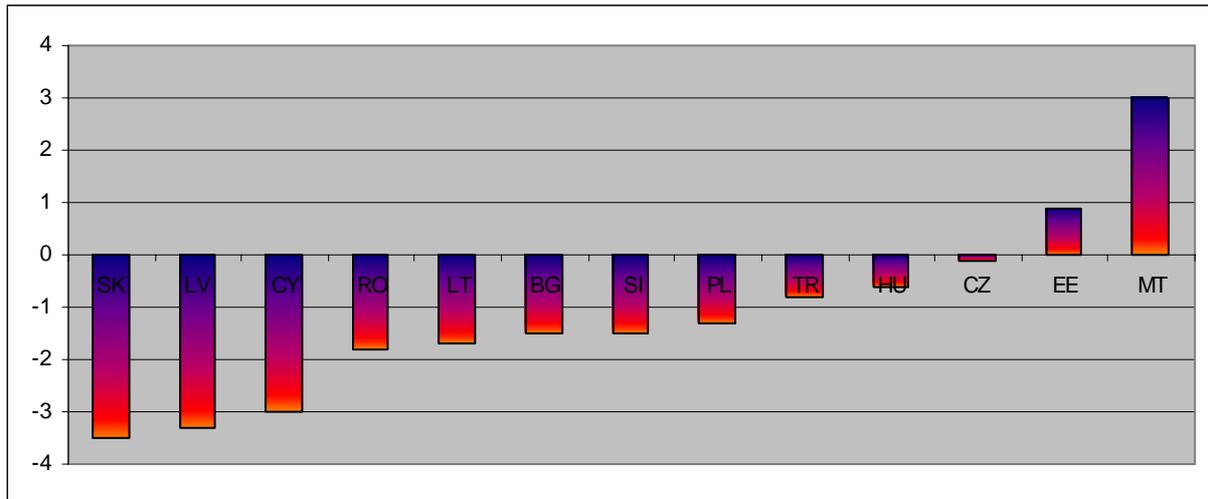
#### a. Methodological note

The ICT sector trade balance is another variable, which helps in understanding the role of this sector in New Member States and Candidate Countries. The trade balance reflects whether a country has a diversified production sector or if it is simply a processing country, or one which needs to import ICT equipment and services due to the lack of domestic production. The trade balance helps slightly in refining the picture given by the previous indicator.

Two indicators are used. The first is the trade balance in ICT products as a percentage of GDP, which is the traditionally applied indicator. The second is the share of the ICT trade balance in total exports, which aims to take into account the size of the export sector. The reason for using this indicator is that similar ICT trade balance/GDP ratios may be produced by different export values and ICT sectors. This indicator compares the ICT trade balance relative to exports in order to indicate these differences between individual countries, and also considers the size of their export sector.

#### b. Snapshot

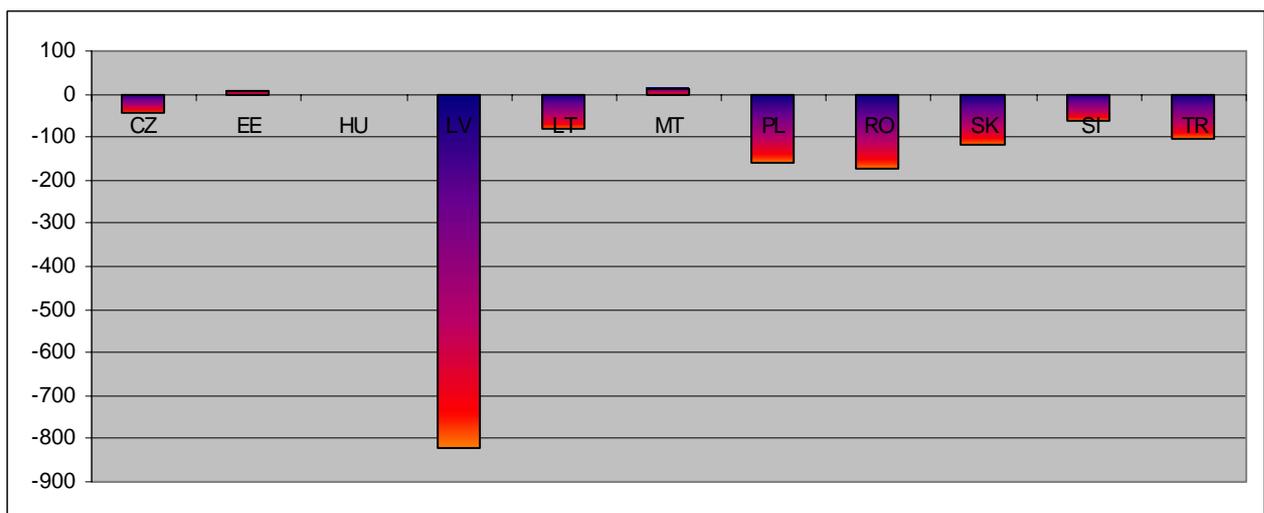
In 2002, only Malta and Estonia had a surplus in ICT trade. However, Hungary's traditional surplus became a deficit in 2002, as shown by the dynamic figures. This was caused by the stagnation of its exports, hit by the decline of EU (mainly German) import demand. The case of Malta is very interesting as it produced significant surplus with the help of a single multinational producer. Malta's export surplus also shows the relatively high added value in production. The same is not entirely true for Estonia, which did not always have surplus in its ICT trade.

**Chart 43. The trade balance in % of GDP in 2002**

Source: Country Monographs, 2003

The negative trade balance in the other countries was due to various factors. In some countries (e.g. Poland, Slovakia) deficits reflected a temporary effect of increasing ICT production – i.e. rising import demand - while in other countries (e.g. Latvia, Lithuania, Slovakia), they were a reflection of very small local production and exports, and consumption entirely based on imports.

The second indicator reveals the role of export sector size. Countries which have relatively small trade balance to export ratios have significant export sectors, while those where the figure is high, have small ones. The chart shows that Malta, Estonia and Hungary have the biggest ICT-producing sectors and the trade deficit or surplus is only a tiny part of their ICT exports, even if the trade surplus represents a significant portion of GDP. In countries with smaller ICT sectors, a small trade deficit to GDP may become sizeable: Latvia, Poland or Romania have accumulated significant trade deficits in ICT sectors.

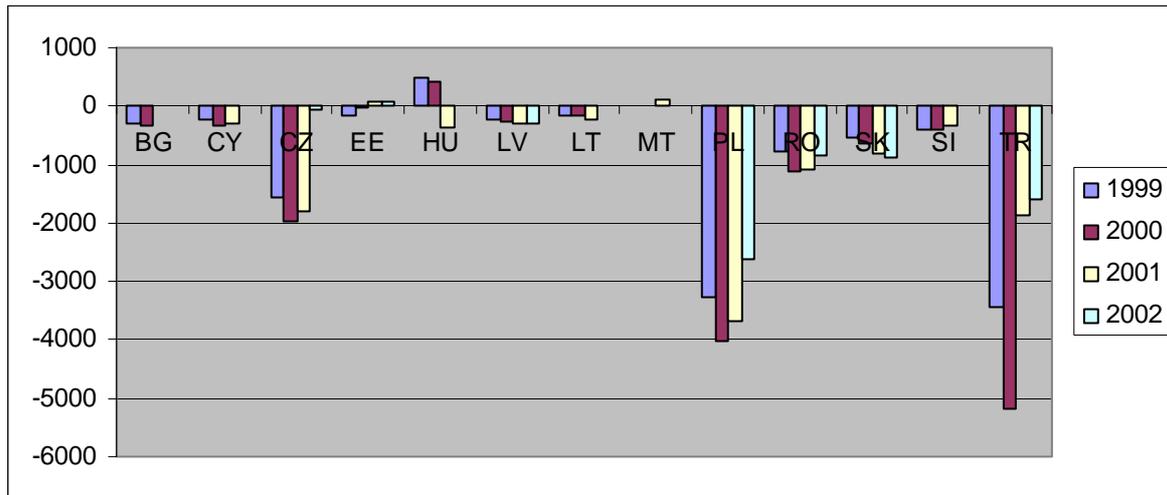
**Chart 44. ICT Trade balance as a share of total exports (%), 2002**

Source: Country Monographs, 2003

### c. The dynamic picture

The dynamic picture presents the evolution of the trade balance of the ICT sectors in absolute levels. As can be seen from the chart, all countries except Malta and, to some extent, Estonia and Hungary recorded trade deficits in this area. Growing trade deficits in Poland, Slovakia and the Czech Republic may represent the initial stage of ICT sector expansion, when it requires more imports than it produces exports, as the initial investments have a high import content and export processing starts later.

**Chart 45. The evolution of the ICT sector trade balance in million Euro, 1999-2002**



Source: Country Monographs, 2003

While the level of imports is similar or even higher in Hungary, Estonia and Malta, these countries began to expand production much earlier and now have much higher export and import levels as well. There is also a third group of countries (Bulgaria, Romania, Slovenia) where the production of ICT for exports plays a small role and where the trade balance varies depending on the strength of consumer demand.

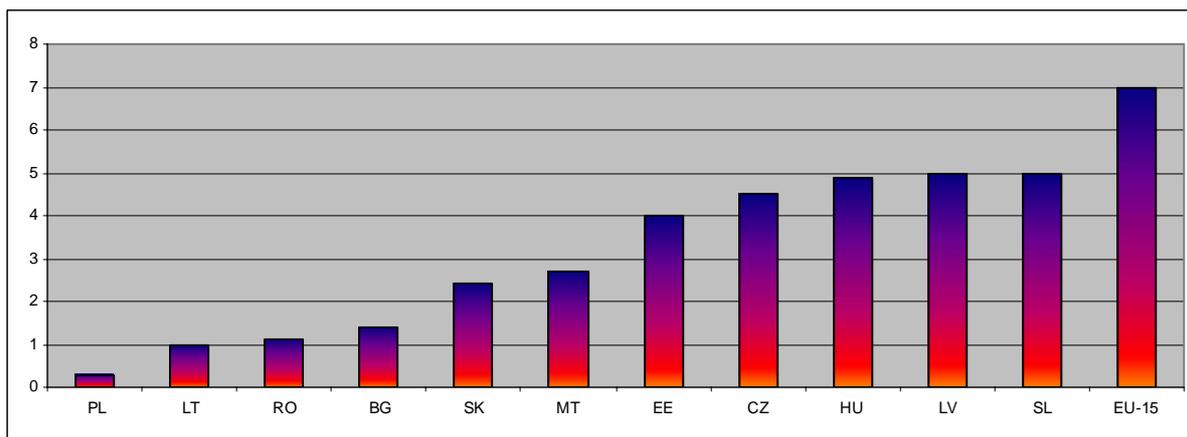
## 4. The share of the ICT sector in employment

### a. Methodological note

The share of the ICT sector in employment is calculated as the share of employment in the ICT sector to total employment.

### b. Snapshot

In New Member States and Candidate Countries, the share of the ICT sector in employment varies between 0.3% (Poland) and 5% (Slovenia). This share is lower than the EU-15 average, where 7% of the labour force was employed in the ICT sector in 2002.

**Chart 46. The share of ICT producing sectors in total employment, 2002**

Source: Eurostat, 2003 and Country Monographs

Two factors account for the low share of the ICT sector in employment in New Member States and Candidate Countries. One of them is the low level of ICT output in general. This is especially true of Poland, Lithuania and Slovakia. In the other countries, where the ICT sector produces a higher share of output, low levels of employment are due to the capital intensive nature of ICT production. Generally, this is made up of electrical equipment, phones and other similar products, which have high productivity levels and require relatively low labour input.

Second, this share is generally below the share of ICT in production, with the exception of the Czech Republic and Latvia. The low level in international comparison is also a reflection of high productivity growth in these countries, which can be seen both in the manufacturing sector in general and in the ICT production in particular.

### *c. The dynamic picture*

The dynamic picture shows the evolution of the ICT labour force at absolute levels. Three countries have a big labour force in the ICT sector (Poland, Hungary and the Czech Republic), while in the case of the others the absolute numbers are very small.

Poland's ICT employment numbers are close to those of the Czech Republic and Hungary, but its production output is much lower. This shows that the disadvantages of the Polish economy have made it relatively unsuccessful in attracting foreign investors and raising its levels of production and employment in the ICT sectors.

## **5. ICT indicators: a cumulative conclusion**

This brief analysis of the ICT sector in New Member States and Candidate Countries leads to several conclusions.

First, the data illustrates the existence of a group of countries which are at the forefront of ICT production capacities in the New Member States and Candidate Countries – i.e. Malta, Estonia, Hungary and the Czech Republic.<sup>21</sup> Though Slovenia, Poland and Turkey also show

<sup>21</sup> Bulgaria has also a relatively sizeable ICT sector due to the inherited legacies from the past, but the competitiveness of this sector and its expansion capacity is strongly limited.

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some strength, the ICT sector is relatively less important for their economies. Each of these countries reveals specificities in the way they have developed their ICT production capacity.

Secondly, there is more contrast between the New Member States and Candidate Countries in ICT indicators than in IST indicators. In IST indicators the countries can be ranked as a continuum. In ICT production, however, some countries have strong sectors, while others do not. Several factors contribute to such differentiation between the New Member States and Candidate Countries, including legacies from the past, the quantity and quality of available human and physical capital, economic policies pursued by the countries (especially with respect to privatisation and foreign direct investments), and the size of the domestic economy.

Thirdly, the value and the market share of the ICT sector in New Member States and Candidate Countries is much lower than it is in the majority of individual EU countries and the EU-15 average. This reflects the fact that the corporate and public sector contribution to the ICT market is smaller and households also spend less in both absolute and relative terms than in advanced economies.

Fourthly, generally and on average for the New Member States and Candidate Countries, the share of ICT output in total is below EU-15 levels (except for some countries with a strong FDI penetration and production in the sector). This also means that, with Enlargement, the New Member States and Candidate Countries' ICT sector will not change radically the size of the EU contribution to ICT-production world-wide. However, what may change is the internal division of labour in ICT production between the old and new Member States, as the latter could be competitive enough to attract some ICT investment away from the existing Member States. Enlargement could therefore result in stronger relocation of ICT production within the EU-25.

Fifth, the share of ICT-related spending and consumption is generally lower for both households and enterprises than it is in the EU-15. However, considering the past trajectory of the EU-15, as well as the income convergence of most, one may expect that spending and consumption levels will increase and will result in much faster growth rates for ICT production in several New Member States.

Sixth, the future of the ICT sector is very country-dependent. Some countries may have the opportunity to utilise their size and develop a more competitive and stronger ICT sector partly oriented to domestic sales, utilising local market knowledge (Poland, Turkey and Romania). Others may lead structural reforms, which will bring sufficient increase in productivity and may help them to overcome competitiveness problems and maintain their leading position in the region in ICT production (Hungary, Estonia). Finally, some (Slovenia, Czech Republic, Romania and perhaps Slovakia) may try to be more competitive by penetrating certain market niches where they have long-term competitive advantages over other producers.

Finally, and in line with the above mentioned differences between ICT supply and IST demand, there is less room in ICT to determine region-wide trends in sharp contrast to the evolution of IST. The position of a country in ICT production depends more on general competitiveness, supply-side strengths and assets, which are more country-specific than the factors affecting IST developments. Closely linked to these accumulated assets, comparative advantages matter a lot and therefore it is not likely that countries, other than the mentioned four major producers (Malta, Estonia, Czech Republic and Hungary), will be in a position to develop competitive producer sectors.

## **CHAPTER III: SOCIO-ECONOMIC FACTORS AFFECTING ICT/IST DEVELOPMENT IN THE FUTURE**

The 13 Country Monographs, used as a background to this Synthesis Report, identify a variety of factors that have contributed to the development of the Information Society in the New Member States and Candidate Countries in the last decade. The differences in economic structures, development levels and policies pursued during this period make these factors country-specific. However, these factors were shared – with differences in timing and extent - as major common determinants of IST/ICT developments.

In Chapter II, we have deliberately presented the indicators relative to two facets of the Information Society in separate sets - the demand or use-side of IST and the production or supply side of ICT. Such a strict differentiation is less valid, however, when aiming at identifying the determinant factors of such developments. Supply and demand are strongly related phenomena and their developments are influenced, to different degrees but simultaneously, by a set of common factors.

From the qualitative and quantitative analysis presented in the Country Monographs, we consider the following as having been the decisive determinants of IS developments in the 90s in New Member States and Candidate Countries:

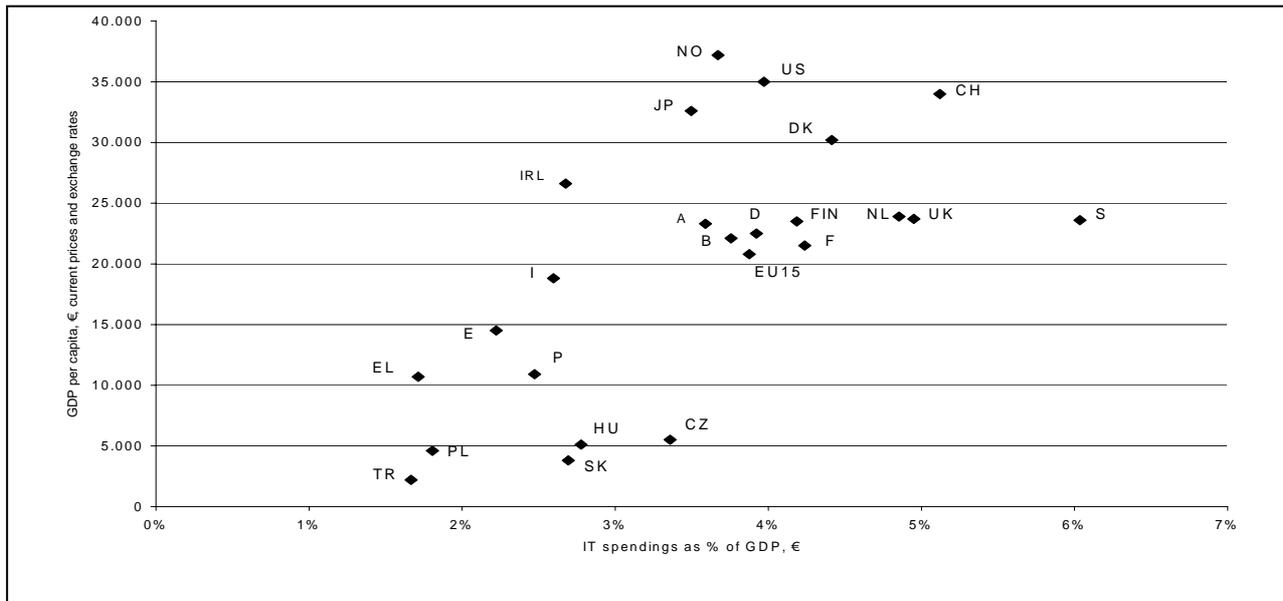
1. The dynamics of economic growth and income convergence
2. Strong restructuring and remaining structural legacies
3. Sustainability of public finances and public sector reform
4. Privatisation and regulation
5. Financial sector development and financing of the ICT sector
6. Proactive attitude of the private sector
7. Inflow of FDI and real and financial openness
8. Household consumption patterns and their changes
9. Educational levels and supply of human capital
10. Regional disparities and social divides
11. Demographic stocks and trends

This chapter reviews briefly these eleven long-lasting factors that have strongly affected IS developments in New Member States and Candidate Countries.

## 1. The dynamics of economic growth

The experiences of the 13 countries analysed confirm the results of international surveys (OECD, 2002 for example), which show that income level and its growth strongly influence the nature and speed of the spread of Information Society. The chart below shows the strong correlation between the level of Information Technologies spending and that of GDP in industrial countries and the New Member States.

**Chart 47. GDP and IT expenditure as % of GDP in 2001**



Source: *Slovakian Country Monograph, version August 2003. Graph quoted from EITO, 2002*

However, economic growth has not followed a linear trend in the transition countries in the last decade. An initial transition-related output collapse experienced in the early 1990s was followed by different recovery patterns. Some countries (e.g. Poland) recovered quickly, while others (Romania and Bulgaria) later and much more slowly. In more recent years, former transition economies have experienced fast economic growth that has allowed them to recuperate the losses of the early 1990s, in some cases (Poland, Slovenia, Hungary) exceeding the real GDP level of 1990 and reducing the development gaps existing between them and the EU-15 average.<sup>22</sup> Non-transition countries had generally favourable economic growth over the analysed period: Cyprus and Malta grew twice as fast as the EU-15 average and Turkey had high growth rates, notwithstanding its repeated financial collapses.

But growth has generally been fragile: both exogenous shocks (currency crises of the late 1990s, the spill-over effect of the Balkan war and the recent EU slowdown) and internal problems (inconsistent monetary and fiscal policies, costly restructuring, corporate and banking sector consolidation, reversals in structural reforms, etc.) made GDP growth volatile. The most vivid examples have been Slovakia (1999, currency crisis and subsequent restrictive macroeconomic policies), Poland (restrictive monetary and lax fiscal policy for disinflation from 2000 onwards), Lithuania (Russian crisis in 1999) and Turkey (macroeconomic imbalances, 1994 and 1999; earthquake, 1999). These difficulties slowed down consumption

<sup>22</sup> Especially high GDP growth has been observed in the Baltic States, followed by Poland and Hungary, and recently by Slovakia as well.

and investment potentials in ICT production as well as use. While accession to the EU for the New Member States has created both new opportunities (trade creation and growth) and binding policy constraints (Stability and Growth Pact), these exogenous or policy driven shocks will also influence IS developments in the short-term future. There are therefore two equally possible scenarios: these countries could catch up quickly or simply muddle through. In the latter scenario, exogenous and policy driven shocks will continue to slow down catch up and, in the worst case, even derail it.

Growth and income convergence have been important factors affecting IS developments. Growth increased disposable incomes and private investments, allowing increased use of mobile phones and the Internet, and growth in number of PCs. ICT spending – while having different and country-specific levels - started to increase in line with accelerating GDP growth in the second half of 1990s: while average ICT spending in GDP remained constant between 1993 and 1996, it increased by 55% between 1997 and 2001.

**Table 3. ICT spending/GDP (%) in selected countries between 1993-2001**

| Country         | 1993  | 1994  | 1995  | 1996  | 1997  | 1998  | 1999  | 2000  | 2001   | Avg.  |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| Bulgaria        | 2,23% | 2,88% | 2,32% | 2,71% | 2,97% | 3,11% | 3,60% | 4,12% | 4,17%  | 3,12% |
| Czech Republic  | 5,56% | 5,34% | 5,95% | 5,80% | 6,44% | 6,56% | 7,85% | 9,10% | 8,73%  | 6,81% |
| Hungary         | 4,17% | 4,32% | 3,88% | 4,28% | 4,46% | 7,50% | 8,23% | 8,93% | 10,02% | 6,20% |
| Poland          | 2,06% | 2,08% | 2,16% | 2,28% | 2,57% | 4,59% | 5,43% | 6,06% | 5,95%  | 3,69% |
| Romania         | 1,07% | 1,09% | 0,93% | 1,03% | 1,28% | 1,39% | 2,09% | 2,32% | 2,41%  | 1,51% |
| Slovak Republic | 4,23% | 4,18% | 4,04% | 4,02% | 3,89% | 5,55% | 6,78% | 8,12% | 8,78%  | 5,51% |
| Slovenia        | 3,02% | 3,03% | 2,92% | 3,08% | 3,39% | 3,72% | 4,42% | 5,26% | 4,72%  | 3,73% |

*Source: Polish Country Monograph, June 2003 version, p.36. Quoted from: WITSA (2002)*

In general GDP growth, disposable incomes and resulting expenditure patterns (the share of GDP on ICT expenditure is higher in countries with higher GDP) partly explain the positioning of “better-off” countries (e.g. Czech Republic, Hungary) in terms of impacts on IS developments. Other factors, however, have been equally important in explaining the spread of the Information Society. Further explanatory variables should be incorporated when considering Estonia’s position (low GDP per capita level / high IS development), the comparatively low ICT-related spending in Slovenia notwithstanding its highest income level among the New Member States, or on the contrary the high ICT expenditure in Slovakia.<sup>23</sup>

<sup>23</sup> In Estonia and Malta, information society developed due to early policy recognition and the desire to catch up with advanced countries. In Slovenia low ICT-related expenditure was due to the sector being less exposed to external and market driven adjustment, and the private households’ consumption patterns differing from other New Member States. In Slovakia, the ICT expenditures higher than justified by income level were caused by income and price convergence, and by strong demonstration effects (Austria, Germany, and Czech Republic).

## 2. Restructuring: expanding service sector and reindustrialisation with remaining structural legacies

IS developments have been positively influenced by two structural changes that took place in the recent decade in the New Member States and Candidate Countries: the expansion of the service sector and industrial restructuring (de- and reindustrialisation).

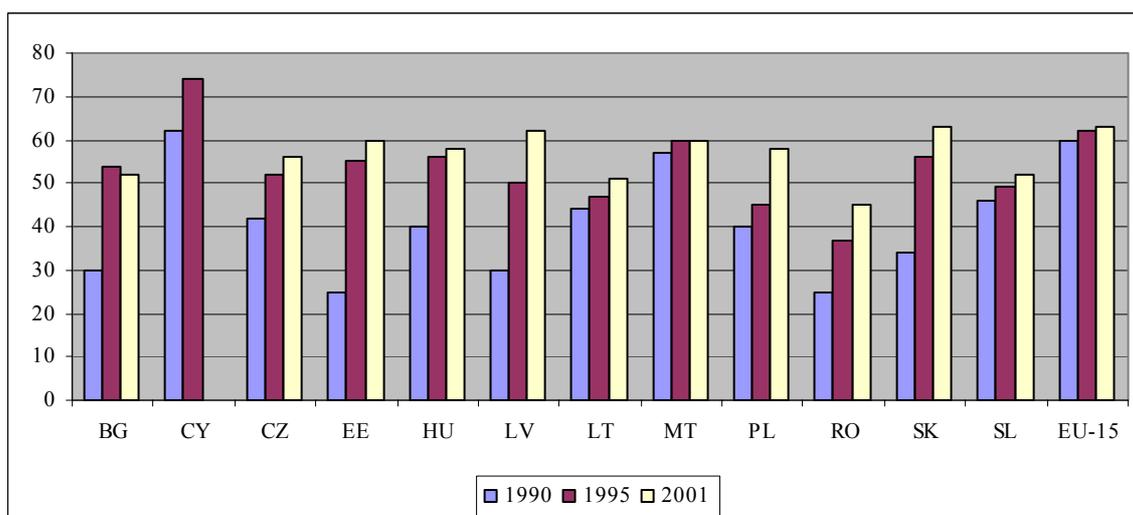
The expansion of the service sector has been driven both by supply- and demand-side factors. The former stems from the fast expansion of the formerly neglected service sector (banking, retail trade, logistics, etc.) due to the privatisation-opening-FDI inflows mix and the relatively easy expansion of several services due to their lower capital intensity and higher return on capital.

Demand factors are linked to income convergence, related changes in consumption patterns from primary towards tertiary consumption, and to the existing differences in the speed of price convergence in the tradable and non-tradable sectors. While tradable prices are basically equalised, the catch up of non-tradable (and service) prices is slower, making services cheaper, and leaving further scope both for their expansion and price increases.

The growing share of services has increased the demand for ICT as some segments of the service sector are more ICT intensive than others. This can be seen in Slovenia, where services such as telecommunications, transport and storage, wholesale and retail have grown the fastest in the period 1993-2001. These are the first sectors, together with financial services, to invest in ICT solutions.

While the share of services grew fast everywhere, 2001 figures show that some countries still have slightly weaker shares, most notably the Czech Republic, Lithuania, Slovenia, Bulgaria and Romania. In these countries, the full potential impact of the shift towards the service sector on IS developments will only be seen in the near future.

**Chart 48. The share of services in total output (%).**



Source: *European Competitiveness Report, 2002*

Industrial transformation and remaining structural legacies have been other important factors influencing IS developments. Restructuring started with de-industrialisation under changing market conditions, but in several countries (Estonia, Czech Republic, Hungary and, after a delay, Slovakia) it was followed by reindustrialisation and expansion of modern industries like chemical, machinery industries and the ICT sector.<sup>24</sup> Only some of the thirteen countries analysed (mainly Estonia, Hungary, Malta and the Czech Republic, as seen in Chapter II) developed an ICT production capacity during the late 1990s, with a level of performance relevant to the economy-wide productivity, GDP growth or export share.

However, these developments have been dependent on FDI inflows and the technology and know-how transfer associated with it. Due to this and investments occurring initially in low value-added activities (assembly, for example) based on wage competitiveness, the resulting ICT production capacities have been exposed to continuous restructuring challenges. Countries that have a sizeable ICT-producing sector continuously need to compete with low wage middle-income economies, both to keep the established production facilities and to provide the necessary human and physical capital for the increase of value-added content in their ICT production.

FDI had an observable and measurable effect on the overall economy, including the competitiveness of the ICT sector, in comparatively small countries.<sup>25</sup> In the three larger countries (Poland, Turkey, and Romania) similar developments have been observed on a much smaller scale,<sup>26</sup> partly due to their disadvantages in attracting FDI and to the presence of a vivid local ICT-producing sector. They shows that size matters and some of the larger domestic or foreign-owned ICT companies located in these national markets may show stronger growth in the longer term than the ones presently active in the smaller countries.<sup>27</sup>

Besides the structural changes linked to the expansion of the service sector and reindustrialisation, the growth of the ICT sector in some countries is indirectly affected by the presence of industrial and agricultural legacies. In the industrial sector countries such as Poland or Romania need to restructure their giant and highly inefficient public sector based industries (e.g. steel, shipbuilding or mining), while others (Hungary, the Czech Republic, Baltic countries) need to speed up restructuring from labour towards capital and technology intensive sectors. Moreover, big countries face the serious structural problem of the adjustment of their agricultural sectors, reduction of agricultural employment and streamlining of agricultural production. Considering the level of employment in these sectors, it is also a long-lasting social problem.

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<sup>24</sup> In the three non-transition economies of Cyprus, Malta and Turkey the “creative destruction” effect of the transition was certainly not felt, and there restructuring was more gradual and balanced. On the other hand other trends of 1990s (increasing globalisation and openness of middle income economies, inflow of foreign direct investments, and privatisation of state-owned enterprises) were equally present and influenced industrial restructuring. In Turkey the recent decade brought significant upgrading of industrial potential and in Malta the huge investments in the ICT sector were one of the driving forces in reshaping the economic structure. In Cyprus however the structure did not change too much with a strong focus on services and agriculture.

<sup>25</sup> This is particularly clear in a case of Estonia.

<sup>26</sup> The dispersion of FDI and the relative size of ICT production do not allow to generate such an impact on the industry profile or the national economy as the “replacement” of old industries by ICT productive or intensive using ones is more “discrete” phenomena.

<sup>27</sup> Still, those large companies will never impact the national economies in a comparable way.

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These legacies represent a serious problem for IS developments. First, not only do they represent general economic costs, they also deepen regional and social divides and thus digital ones. Regions with collapsing industries or countries with disproportionately high agricultural populations may find it difficult to commit resources for IS developments amidst these tensions. Second, the restructuring of these areas will be costly and will be financed by governments restricting the amount of public funding provided for IS developments. Third, and closely linked, these structural problems may divert policy makers' attention from IS developments as governments may not weigh the short-term costs of structural problems against the long-term gains from IS developments.

### **3. Sustainability of public finances and public sector reform**

The public sector played a generally negative role in Information Society developments, partly because its reform and the establishment of sound public finances have been one of the most difficult policy issues. First, governments generally lacked the necessary financial means to support Information Society initiatives, because of continuous fiscal pressures and inability to restructure expenditures and revenues. Lack of IS-related funding weakened ICT penetration in household and public sectors. The need to maintain high tax rates reduced tax credits and concessions for ICT investments, which could have supported the population's wider access to information and communication technologies and high tax rates reduced investment rates in the corporate sector.

Second, the inadequate or non-existent reform of public services resulted in provision of public services and goods in an inadequate structure, with insufficient efficiency and quality. The institutions in these areas have little incentive to modernise themselves and to proceed with a broad application of Information Society applications.

Finally, as governments were constrained by other priorities they did not pay adequate attention to IS developments at all levels of general governments. This has been reflected in two major weaknesses: inadequate funding of IS policies and poor quality of content development in the public sector.

While these features characterize most of countries, there were differences among them. More attention has been devoted to IS policies in Estonia and Slovenia than in the other countries. The governments' approach to IS developments has recently improved somewhat as more funding and more adequate programmes were launched in several countries (Hungary, Poland, Romania and Slovakia, for example).

The Country Monographs show that the contribution of the public sector to IS developments will also be mixed in the forthcoming years. On the one hand, the amount of public funds devoted to IS development may increase and will be predominantly directed at two major areas. First, IS developments require the mobilisation of public resources in eGovernment, eHealth, eLearning, etc. Second, more domestic resources will be devoted to the co-financing framework for EU funds (such as the Structural Funds), which could accelerate regional development and reduce regional and social divides (including the digital divide).

Second, while these investments are likely to happen, several factors will create problems for governments and strongly influence the speed of IS developments. Most countries face serious structural fiscal imbalances, while according to several recent studies (Deutsche Bundesbank (2003), ECB (2004), Kopits-Székely (2004)) accession per se worsens fiscal balances by 1.5-2% annually in the New Member States. As a result, the sustainability of

public finances will require strict fiscal policies, which may limit the availability of funds for IS developments and make them more volatile.

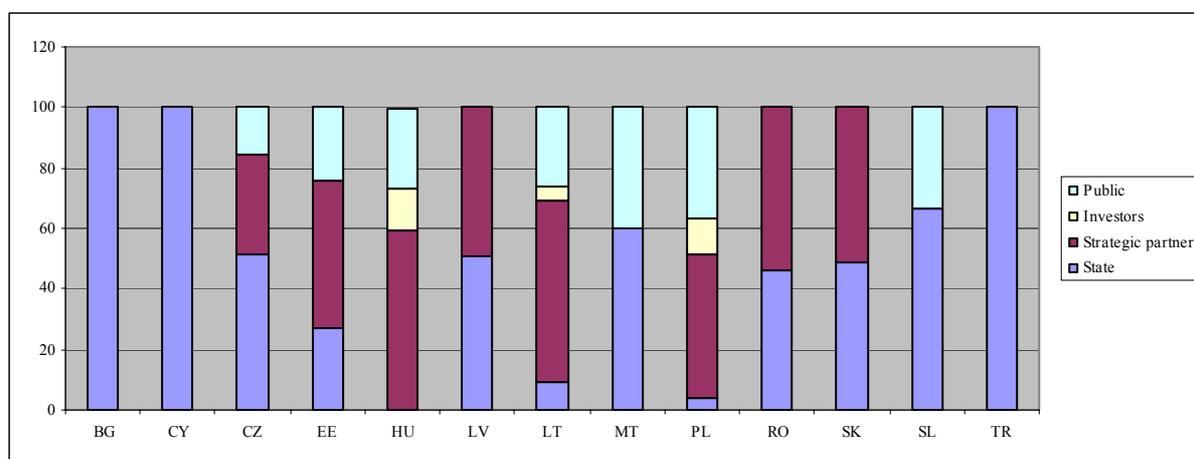
Third, countries are expected to reform the provision and the principles of access to public goods. While these reforms will streamline public expenditure, initially they will lead to increased costs and might worsen fiscal balances. There is a trade-off between the speed and sustainability of reforms: fast public sector reforms worsen fiscal balances, and may reduce the amount of public funds spent on IS developments. However, the medium-term outcome should be positive where reforms are well-managed and credible and policies are consistent. Moreover, the lack of public finance reform represents a serious threat to IS developments, as the financing of the current redistribution levels may divert resources from them.

#### 4. Privatisation and regulation

Among general purpose government policies, which indirectly influence the development of the ICT sector, privatisation and regulation played a special role. The sale of the incumbent operator and other segments of the ICT sector were decisive, and competition policy on the telecommunication market and regulation of privacy and security issues, e-commerce, and digital signatures were very important. The divestiture of the incumbent operator was essential: the date and timing of privatisation has had an observable influence on technical upgrading, quality and tariffs.

There were three different “models” in terms of privatisation of the incumbent operator. First, in countries (Hungary, Romania and Bulgaria) where the incumbent operator was privatised mainly to foreign operators, divestiture was followed by new investments, which increased penetration and quality of services. Privatisation was carried out without deregulation and establishment of competitive markets, as public monopolies were transformed into private ones. Privatisation required new owners to invest heavily in technical upgrading and services and financing of depreciation neglected prior to privatisation. It did, however, generally provide guaranteed profitability for investors. The outcomes of privatisation were mixed: quality improvement and better fixed-lines access was accompanied by price increases to cover costs and guarantee profits. The costs of privatisation without appropriate regulation came later, when the presence of a monopolistic supplier weakened price and non-price competition.

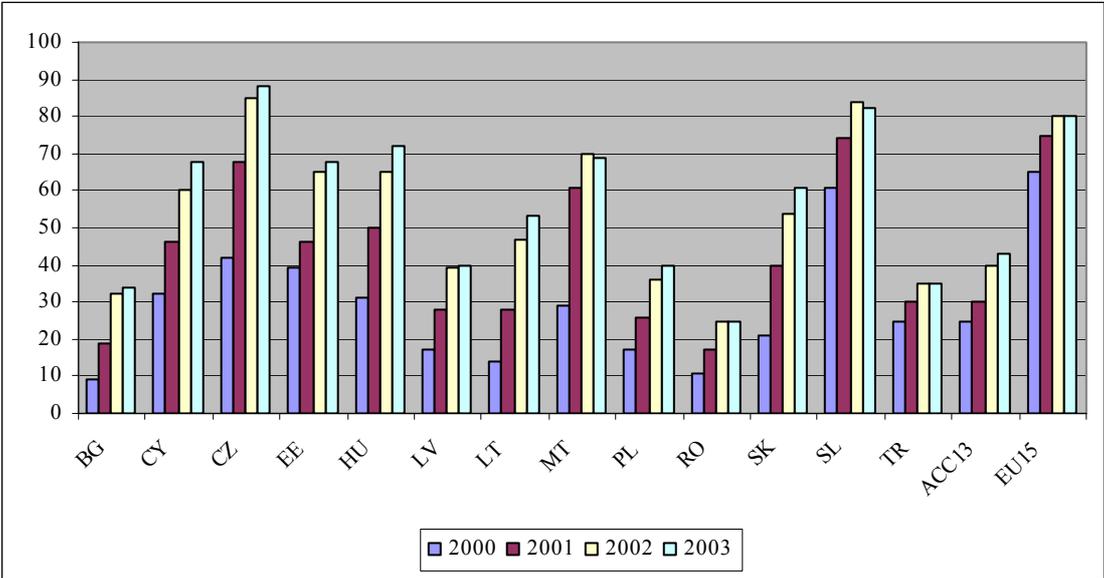
**Chart 49. The diversity of incumbents’ ownership structures at the end of 2003.**



Source: IBM, 2003. 4<sup>th</sup> Report on Monitoring of EU Candidate Countries. Based on NRAs data.

Second, countries that privatised late (Poland, and the Czech Republic) lagged behind in the qualitative and quantitative development of the telecommunications sector. Fiscal constraints, corporate problems, under-capitalisation of the incumbent operator, low levels of technical development prevented the fast modernisation of this sector. Slow privatisation of the incumbent operators had mixed effects on the telecommunication sector as a whole. While it slowed down the growth of the fixed-line market, it simultaneously increased mobile penetration, causing fixed-line access to be substituted to a large degree by mobile access. While the country differences in mobile penetration are also the outcome of various other factors (income growth and level, presence of alternative service providers, etc.), high penetration rates in Slovenia or the Czech Republic partly reflect the diversion from fixed-line operators.

**Chart 50. The fast increase in mobile penetration rates (%) in New Member States and Candidate Countries between 2000 and 2003.**



Source: Eurostat 2003 and Country Monographs.

The third model (Turkey) was a mixture of the first two, where the ownership of the incumbent operator remained in public hands but heavy public funding in infrastructure developments was directed at catching up in fixed-line penetration. The major drawback of this solution (besides the questionable efficiency of public ownership) is that it depends on the state of public finances, which is a problem in the Central European New Member States and Turkey.<sup>28</sup>

Altogether, privatisation was helpful for ICT development as it brought fresh capital needed for new investments, and led to quantitative and qualitative improvements in the telecommunication sector. However, the benefits were fully felt only in those countries where competitive markets were maintained and regulation was appropriate. However, the number of these countries was limited, as unlike privatisation, regulation policies had a negative effect on ICT development (including telecommunication sector development).

<sup>28</sup> In countries, where public finances are fragile, governments frequently have the incentive to improve the sustainability of the general government balances by postponing or reducing investments and financing of state-owned enterprises, which is reflected in the worsening quality of publicly-provided services.

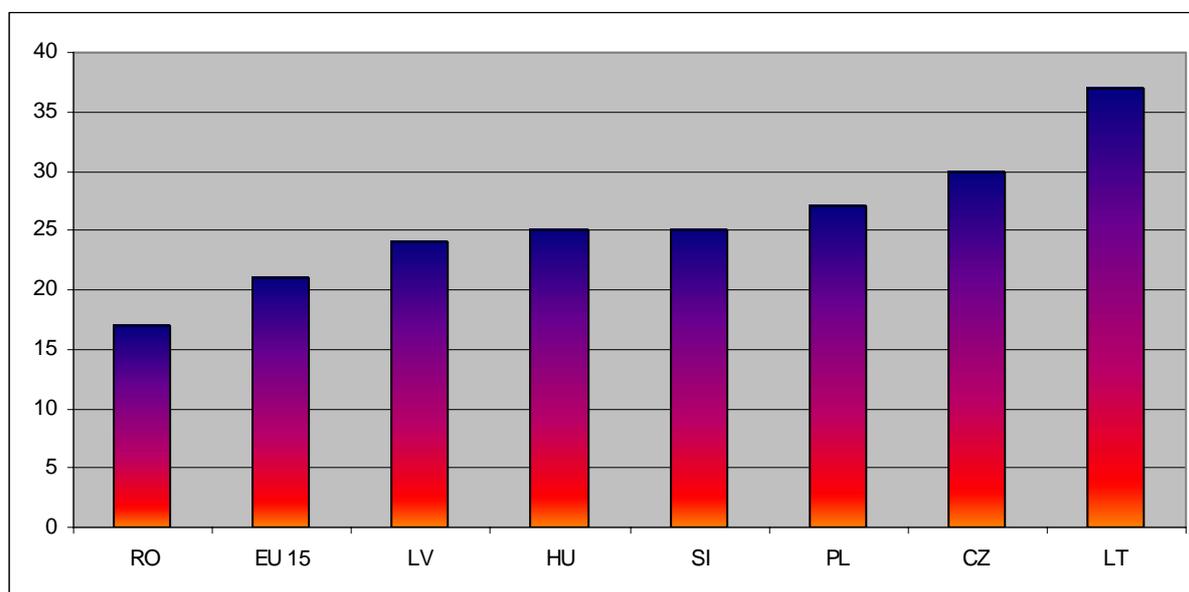
The major problem for regulatory authorities was the restriction of the incumbent operators' market power. At the same time, National Regulation Authorities were often kept in weak positions and incumbent operators made every effort to preserve their market positions by influencing the regulators. Inappropriate competition policy, lack of price regulation and measures against unfair competition, and abuse of monopolistic powers have been major problems.

Moreover, the liberalisation of services typical in the 1990s for advanced economies did not occur and the pressure of lobby groups prevented the development of competitive markets, with the exception of mobile telecommunication.<sup>29</sup> The lack of competition resulted in low access rates, comparatively high prices, and weak quality of the services needed for the spread of ICT.

The presence of serious loopholes in existing regulations and laws has been another regulatory weakness. In many areas, most notably in security, electronic commerce and electronic signature, the legal background has been either inadequate or insufficient to establish the required level of confidence. Either the related laws have not been adopted in time, or their legal background and implementation have been weak.

One main reason behind these regulatory weaknesses has been the strong lobbying power of the incumbent operators, which prevented the adoption of appropriate regulations. In some cases privatisation was also responsible, as frequently it explicitly limited the scope for competition and regulatory policies.

**Chart 51. Tariff rates in selected countries, measured by monthly off-peak access charges in Euro, 2002**



Source: Eurostat, 2003

## 5. Financial sector development and its financing capacity for the ICT sector

The financial sector in the countries analysed has gone through significant changes. Transition countries have created a private banking sector from a mono-bank system, with the

<sup>29</sup> There is still very little effective competition in the fixed-line segment of the telecommunication industry in most of the analysed countries.

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majority of assets in private banks, the effect of strong discipline of foreign owned banks, and an appropriate institutional, supervisory and regulatory framework. The three non-transition economies have also proceeded with strengthening the stability of their banking sector, improving access to financial services and making their financial sectors more competitive.

Notwithstanding the fast catch-up of financial sectors and its close link with growth, the contribution of the financial sector to the development of the information economy has generally been weak. First, the financial sectors of New Member States and Candidate Countries are still considerably underdeveloped compared to those of the EU-15 Member States. All the major indicators of financial development (M2/GDP, banking assets/ GDP, stock market capitalisation/ GDP) are only 25-40% of the EU-15 level, limiting the financial intermediation of the banking sector and capital markets. A related weakness is the strong reliance on banking-sector financing and the underdevelopment of capital markets and equity financing. This is an outcome of the German-type of financial development in the New Member States and Candidate Countries. The lack of capital market financing hampers venture capital and equity financing, making the ICT sector more dependent and vulnerable to banking sector shocks.

Second, the banking sectors of the countries analysed do not provide all the financing instruments available in advanced countries, the most striking example being the financing of small and medium sized enterprises. Even in those countries where increased competition for primary clients forced banks to seek new and more risky market niches, the general level of SME financing is very limited compared to advanced economies. A related backlog is household lending, which until recently has remained generally insignificant, notwithstanding its recent rapid growth in many countries. The banks do not have appropriate monitoring and financing capacity, they are risk-averse and strongly under-finance the household sector, preventing it from consumption which would facilitate and increase their ICT-related investments.

Third, long-term financing is still limited or is available mainly as foreign currency financing, bearing the exchange rate risk. The lack of long-term funding is due to low and declining saving levels, the weak ability of the banking sector to perform maturity transformation adequately, which leads to dominance of short and medium-term assets. This creates problems for ICT investments, which are long-term.

## **6. Proactive attitude of the private sector**

In most countries, and particularly in those few that have developed stronger ICT sectors during the period (Hungary, Estonia, Slovenia, etc.), the private sector has taken a major role in the development of the IS.

The most visible engine of IS growth has been corporate FDI, often targeted at ICT-intensive and ICT-producing sectors of the economy.<sup>30</sup> Another important actor for ICT sector growth has been the group of bigger domestic ICT producers, whose core business is at the heart of IS developments, focusing on both producing these technologies, and on delivering the accompanying services. In most countries, a notable group of ICT industrialists has been lobbying for years in favour of further and more rapid absorption of those technologies.

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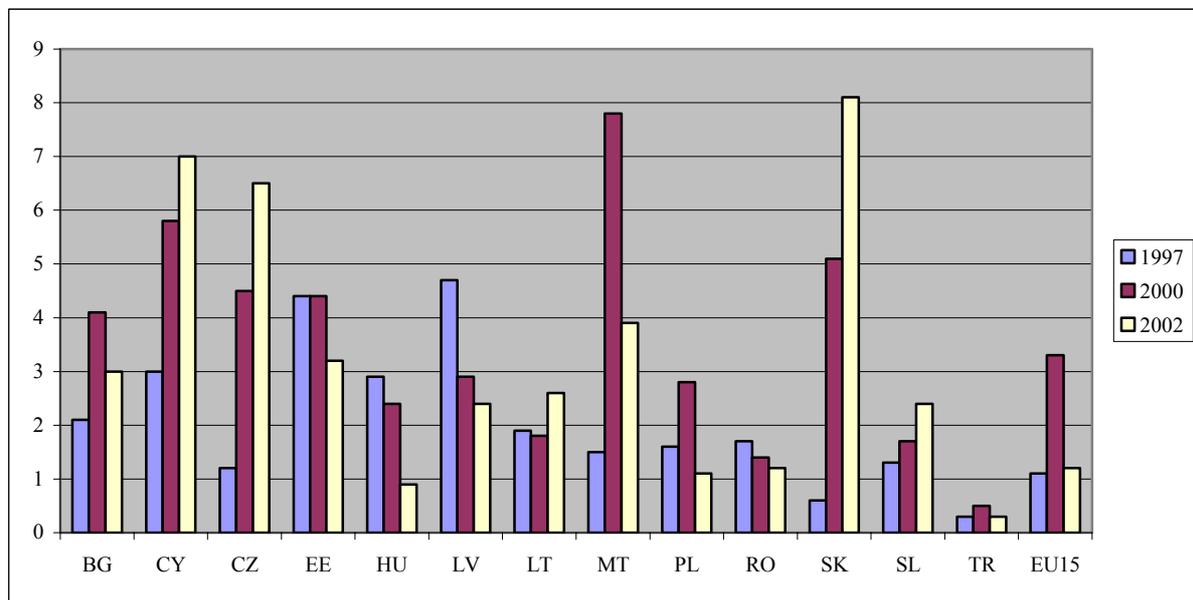
<sup>30</sup> In particular Telecommunications, the banking sector and insurance, wholesale and retail.

Finally, the new ICT-using entrepreneurs, - often leading small and medium-sized companies - have to match and compete with other foreign and domestic companies. ICTs are, in some cases, a means of increasing productivity and competitiveness. However, empirical evidence in the analysed countries suggests that the take-up of ICTs and their relevant use in these companies is not massive because of the lack of financial resources and of managerial and technical know-how. This limits the opportunities offered by technological catch-up.

## 7. FDI and the economic openness of the countries

The expansion of the IS was heavily influenced by FDI inflows, driven by the real and financial openness of the majority of the countries analysed, by the price and quality of physical and human capital and by the political commitment towards foreign investments. Before assessing the impact of FDI on ICT, several caveats need to be mentioned.

**Chart 52. Inward FDI as % of GDP in selected years**



Source: Eurostat, 2003

First, besides the differences in statistical methods,<sup>31</sup> there have been significant differences in foreign capital inflows in the individual economies because of country-specific approaches to FDI and the evolution of their cost competitiveness. The timing of privatisation was one of the key factors explaining Hungary's leading position between 1995 and 1997, followed by Poland and the Czech Republic between 1998 and 2001. On the other hand, increasing competitiveness and attractiveness for foreign investors resulted in huge recent increases in FDI inflows to Slovakia and Romania. In Bulgaria, full privatisation of real and financial sectors to foreigners explains the high level of FDI, while in Slovenia a generally more negative approach was behind the observed low shares. Second, total FDI inflows have been volatile because of their close link to the timing of structural reforms, while green field-related FDI flows have been smaller and more stable. Finally, when considering the role of foreign investments in the ICT sector, it is more important to look at FDI stocks than flows. In terms of stocks, the main recipients of FDI inflows (Poland, the Czech Republic and

<sup>31</sup> Some countries do not count reinvested profits as FDI, while others also include in the foreign direct investment statistics commitments besides the actual disbursement, which makes the comparison between the countries sometimes difficult.

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Hungary) have high values. With FDI/GDP or to population ratios, however, there has been a strong dispersion among the countries.

The inflow of FDI contributed significantly to IS developments through three major channels. The first is the impact of FDI on ICT production as in several countries (Hungary, the Czech Republic, Estonia and Malta) the vibrant ICT industry and its high share in the national economy reflects foreign ICT-targeted investments. This positive effect of FDI was also realised through the embodied technology effect as foreign investments accelerated the modernisation of ICT production. The second contribution of FDI to the IS came through the upgrading of industrial and service sectors through the restructuring of ICT-using industries. This was followed by increasing demand for information and communication technologies. Third, in some countries foreign direct investments in ICT production gradually evolved from wage-related assembly type investments towards more sophisticated ones, including regional distribution, logistics, research and development centres. These allowed the establishment of a more diversified investment portfolio and the keeping of ICT-related FDI. However, in many cases, the input of FDI in terms of human and technical know-how transfer was either limited or disputable. Some investments have not been accompanied by major know-how transfers, and harsh competition for limited financial resources (FDI) may have led some countries to improve attractiveness by lowering constraints on R&D or training facilities.

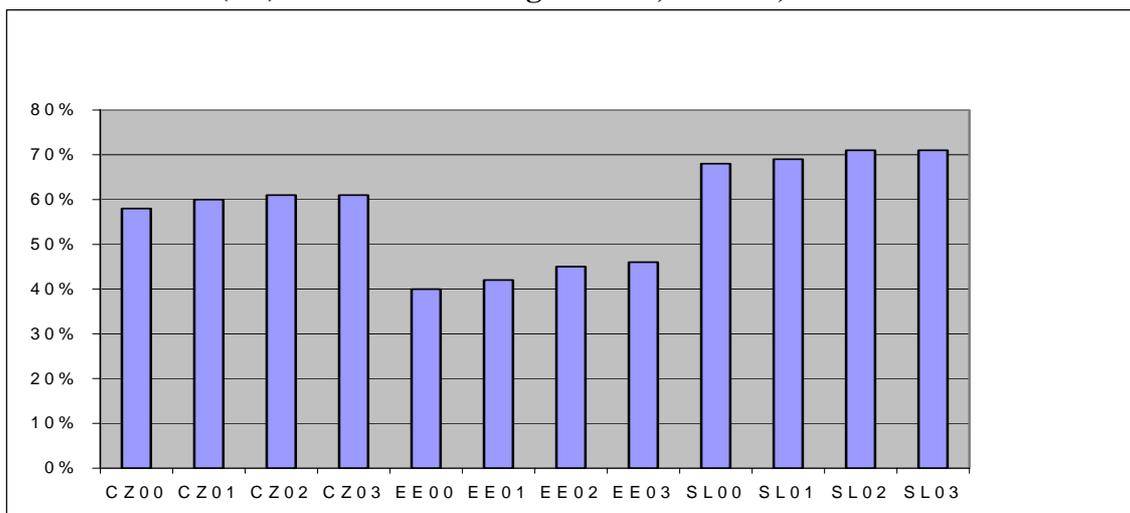
The accession of ten out of the thirteen countries analysed to the European Union puts the evolution of FDI in the ICT sector into a different perspective. In general, the entry of these countries into the European Union will not increase the amount of FDI inflows, as most of the accession-related inflows have already materialised. On the other hand, it is likely that the new entrants will utilise their comparative advantages within the Single Market and their cost benefits will result in progressive redeployment of ICT-related facilities from former to New Member States. Some of the existing production facilities and some new outside investments may be brought to the New Member States after Enlargement. While the increase of such investment is likely, its structure remains uncertain. It strongly depends on the evolution of the competitive advantages of New Member States, and on the changes in labour and capital costs, and the supply and quality of human and physical capital. If the New Member States are able to keep the improvement of the quality of human and physical capital with its expected price increase, then new investments will increasingly be directed towards higher value-added segments of the production scale.

Finally, it is expected that the inflow of FDI will concentrate on those countries which have so far been the major recipients of ICT-related foreign investments because of their advantages in terms of local knowledge and links, knowledge of local markets, production advantages and concessions. Therefore it is expected that new FDI will be focused on those countries that have already received most of it. As a result no “flying geese” effect of ICT-related investments is likely to occur in the region.

## **8. Households consumption patterns and their changes**

Closely linked to income growth, the evolution of purchasing power and consumption patterns have been important factors in explaining IS developments. Purchasing power in New Member States and Candidate Countries is well below EU-15 levels, both in absolute terms and in relation to price levels. These are measured by both the actual and long-run equilibrium exchange rate, which generally remains below half the EU-15 average.

**Chart 53. Purchasing Power in the Czech Republic (CZ), Estonia (EE) and Slovenia (SL) in % of EU average in PPS, in Euro, 2000-2003**



Source: Eurostat, 2003

Linked to this difference in income and purchasing power, consumption structure is also different in New Member States and Candidate Countries, as a higher share of incomes is still devoted to primary consumption: The income and composition effects simultaneously reduce the amount of disposable income available for IST services and products. But recent increases in purchasing power<sup>32</sup> and institutional developments have led households to change their consumption patterns slightly, devoting increasing shares of disposable income to non-primary expenditure, including leisure or telecommunications.

This pattern is expected to prevail in the future, considering the recent rise in consumption and incomes devoted to Information Society goods and services. First, all major forecasts project that –at country-specific speeds – the income levels of New Member States and Candidate Countries will converge towards the EU-15 average. Second, besides the level of consumption and incomes, the evolution of real consumption is important, as it takes into account price developments. Currently in most of the countries analysed, price levels are closer to the EU-15 average than wage levels (WIIW (2004)) and, assuming catch up, it is likely that wage growth may outpace price increases.

Moreover, what counts for real consumption of Information Society services and goods is the evolution of their prices. While in general, service prices (and non-tradable goods prices, in general) are expected to increase faster than other prices, this is not likely in the case of Information Society-related prices as these are expected to decline in line with global developments. As a result, the affordability of Information Society goods and services will improve and, together with the increase in incomes and consumption, this will strongly contribute to the growth of their demand.

Third, besides its nominal and real level, income growth also has a compositional effect on consumption. It leads to the substitution of primary consumption by more sophisticated consumption patterns (services, durable consumption goods). The increase of incomes and

<sup>32</sup> This can be seen from the chart where – at least in comparison to EU-15 average – a low income (Estonia), middle income (the Czech Republic) and high income (Slovenia) country reflects the catch up of income levels and reduction of the still existing huge income gaps.

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consumption will bring a shift towards consumption structures with higher service and IS content. The currently weak and fragmented middle classes are expected to expand and this will lead to a further broader-based growth of Information Society-related consumption.

Finally, the growth of private consumption is supported by structural and institutional changes as well as by income growth. The banking sector increasingly finances households and the share of consumption credit has been growing: up until now levels of household debt have been extremely low but these have started to rise. Wealth effects on consumption should also be considered. These factors will also increase household consumption and the share of IS applications in total consumption.

## **9. Educational levels and supply of human capital**

These countries have good and relatively evenly distributed human capital, a well-trained labour force and a highly skilled population. The stock of human capital (though in some cases there are structural differences between skills supplied and demanded) as well as the share of GDP devoted to education is high compared with other European countries and other countries with the same income level.

There are several areas, where some of the countries are especially strong (like natural sciences and engineering in Central Europe) and others where they have been particularly weak (language capabilities). The supply of human capital is good as regards both white and blue collar workers. In the case of IST applications, the society has demonstrated its capacity to absorb technological developments.

The supply of human capital has also been influenced by recent efforts to improve the quality of education, the progressive introduction of ICTs in education, and the commitment to reach the European targeted 3% spending on R&D. First, educational reforms in the last decade had concentrated on increasing enrolment rates. As a result, a much larger share of the younger generation is now enrolled in tertiary education than in mid 1990s. These changes have also produced difficulties, as frequently quantitative growth has not been accompanied by qualitative growth, due to the lack of resources.

Second, information and communication technologies are being introduced into the educational system, but mainly as equipment, or a specific subject of study, rather than tools for learning or teaching. However, the first steps towards their integration into the educational system have mainly been achieved, as can be seen by the growing penetration rates for hardware and Internet access in schools and universities and initiatives such as the Computer Driving Licences, adopted by several countries. Nevertheless, all actors agree that much still has to be done to fully integrate ICTs into the education process.

Finally, studies show that ICT skills at professional level - an essential ingredient for delivering the necessary products and services in the domestic market - have also shown important growth, both at tertiary level and in long-life training initiatives. The New Member States and Candidate Countries do not seem have a serious skills shortage, notwithstanding the recent complaints in some countries about the mismatch of acquired skills.

While the current figures of New Member States and Candidate Countries compare favourably in an international setting, educational systems have several loopholes and problems, which may spill-over in the medium-term to the Information Society. First, though educational systems spend important amounts on tertiary education, spending on primary and

secondary education declines proportionally. The quality of education is worsening and educational results at primary and secondary levels are poorer. This is a serious problem as the costs involved only emerge after a delay, and it takes time to reverse the trend.

Second, educational systems generally have been underfinanced in the thirteen countries analysed. In relation to GDP or government outlays, the share of education expenditure has been either smaller than in advanced economies or it has gradually been declining. Without adequate funding, the negative spill-over effect of education loopholes will affect the quality of education system and feed back into Information Society indicators. Finally, while most countries have embarked on reforming their educational systems, these reforms were limited and did not fully cover the financing, institutional and ownership structures.

Investment in human capital and associated changes in its quality and structure are a long-term phenomenon and fast changes are therefore not expected. While all countries are relatively well supplied with human capital, the Central European and Baltic States have the best starting position and may expect the most positive feedback from human capital on the Information Society. However, even in these countries, governments could still accomplish major investments and devote more public funding to education. Educational reforms, such as putting higher emphasis on primary and secondary education, need to complement these additional funding sources. They also need to invest in ICT literacy and skills to avoid a skills mismatch.

Finally, the educational sectors (especially the tertiary one) have poor connections with the national innovation systems. There is an institutional separation between public or private educational units and public R+D programmes, and links with the private sector (which still plays a smaller role in national R+D efforts) are limited (those that exist are mainly with some domestic or multinational big enterprises). Another problem is that the relationship between local government/development agencies, educational units, and the corporate sector does not function appropriately and thus education units are disconnected from this innovation circle. The costs appear in underfinanced research and education and result in a brain drain.

## **10. Regional disparities and social divides**

### *10. a. Regional disparities*

The countries analysed, and particularly the larger ones, show significant disparities in terms of geographical dispersion of their economic activities. As in advanced economies, capital cities usually have the major share of GDP, and a higher proportion of services, and serve as headquarters for major companies, as well as R&D centres or educational institutions. Besides the usual dominance of capital cities, proximity to major markets matters. In the Central European economies (i.e. Romania and to a lesser extent the Baltic region), western parts of the countries which are closer to major markets and sources of financial inflows are more developed than other parts.

Economic growth and new investments also shape regional disparities as regions with adequate public infrastructure supply and new private investments generally outperform those that lack such assets. This leads to a vicious circle as regions with better infrastructure tend to attract more capital, more flexible and qualified labour, which feeds back to new domestic and foreign investments, while the laggards generally accumulate the disadvantages.

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Regional differences in the thirteen countries, measured by income or employment/unemployment rates dispersion, are generally more important than those observed in the EU-15. Moreover, income and employment gaps have widened since the last decade: the increase of regional disparities is a natural outcome of economic trends shaping the development of these countries. The regional divide reflects the legacy of earlier specialisation (i.e. industrial legacies, size of the agricultural sector) and how they have been affected by transition. Some regions were able to catch up due to the presence of relevant skills, good geographical position, proximity to potential markets, etc. while others, which lacked these assets, fell back.

While regional disparities are an observable phenomena related to growth trajectories, several factors make them an acutely important issue in Information Society development. First, in the ten Eastern European countries, transition had a profound effect on social disparities as well as economic structures. In the early 1990s, structural changes initially downgraded the existing economic structures and increased the gaps between the regions. In the majority of cases, the “winner takes all” development trajectory has maintained (or even broadened) the gaps, even where GDP growth has been higher.

The extent and speed of structural reforms, as well as the downgrading of “negative value adding” activities, had long-term implications for regional disparities and for the availability of supply-side capacities relevant for the Information Society. While some factors (geographical location, traditional backwardness) are hard to overcome in a short period, existing market rigidities, social and structural problems (lack of appropriate housing, low labour mobility and also weak intra-regional capital mobility, etc.) maintain regional disparities.

Second, the New Member States and Candidate Countries have several social and economic features which magnify regional disparities. For example, low mobility of the labour force, housing problems and lack of rental markets, infrastructure weaknesses (mainly transport related), significant gaps between supply and demand of skills, and low levels of foreign language literacy make regional divides more difficult to handle.

Third, governments have paid inadequate attention to regional divides, and provided too little funding for their mitigation. The lack of appropriate finances for putting in place the necessary mechanisms to reduce regional divides, and a weak, unstable institutional background, has significantly lessened the ability of governments to handle regional disparities.

The impact of regional disparities on the development of the Information Society is both direct and indirect. The implications of several social-divide indicators are serious. There is a risk that a vicious circle of growing social disparity emerges: unemployment rates and low revenues are concentrated in areas with few training opportunities, little labour force mobility, lack of basic – and, of course, of high-tech – infrastructures, etc..

The lack of economic potential in those regions that lag behind –particularly those with inefficient industrial and service capacities, under skilled labour force, inadequate transport and backward technological infrastructures - discourages the launch of new economic activities by the corporate sector. These regions do not attract FDI and consequently do not benefit from the related innovation dynamics.

In exactly the same way, lack of skills and revenues, and even more, lack of clear interest in ICT tools, prevents households from investing in new technologies. Additionally, lagging access to basic telecommunication infrastructure makes such investments either very costly or, in extreme cases, useless. As a result, access and use indicators in such regions are usually drastically low.

Considering both the European objectives for an inclusive Information Society, as well as the need to develop a skilled labour force to satisfy the demand from emerging domestic businesses, such regional disparities seriously constrain the development potential of the IS.

#### *10.b. Social divides*

The existing social differences and gaps are other factors affecting Information Society in the countries analysed. First and foremost, the differences in income distribution, as measured by the GINI coefficients and other systems, are generally greater than the EU-15 levels, reflecting more uneven income distribution. Such measurements confirm earlier statements about the potential doubling of disparity indicators in the enlarged Europe, as compared to the EU-15 average.

High GINI coefficients and the income divide bring two further factors that weaken the spread of the Information Society. One is the much higher share of poor people and the vicious circles related to it, if appropriate social policies are missing. Second is the weak presence of middle classes, which would, if they were stronger, serve the base of the demand for Information Society services and products.

Besides income inequalities, a greater social divide is reflected in the unemployment levels of the New Member States and Candidate Countries. This is – with the exception of some countries – generally above the EU-15 average. The structural features are unfavourable, even in some countries where unemployment levels are lower, as low unemployment coincides with higher long-term and youth unemployment. Unemployment in most countries is a structural phenomenon and, while some countries (Slovakia) have recently been able to reduce it with structural reforms, in the majority of high unemployment countries (Poland, Romania, the Baltic region and Turkey) it remains a social problem. Moreover, the New Member States and Candidate Countries have much lower employment and activity rates than older Member States.

Income and employment differences lead to differences in access to opportunities, which affect the spread of Information Society. Certain strata of these societies have poorer access to education, skill developments, and better employment opportunities and this reduces their ability to be integrated, which in turn affects the development of Information Society. School enrolment rates are much lower among the lower income and excluded social groups, health problems are more acute and relatively more costly to solve. Moreover, almost all the countries have an important minority group (usually identified on an ethnic basis) which has generally worse social indicators (including poorer access to Information Society).

#### *10.c. The growing social, regional and digital divide*

The above mentioned widespread disparities in income levels, and the regional and, in some cases, gender gaps, are not expected to decline fast in the New Member States following their accession to the EU. To the contrary, broader disparities are likely to emerge.

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First, accession in the short-term will require serious adjustments from most countries, which will serve as another selection mechanism for catching up and lagging behind regions, professions and social groups. Accession is burdened by the existing structural weaknesses and legacies, which results in further social divides and gaps.

Second, accession will be costly in fiscal terms with the burden falling disproportionately on certain, mainly disadvantaged social groups and regions. In the short-term, it will lead to increasing social disparities.

Third, even convergence is not expected to bring about the reduction of regional or social divides. Considering the validity of the trade-off theory, which states that national convergence in the EU has been accompanied by regional divergence, one may expect that countries that successfully catch up will increasingly see broadening social and regional disparities.

Fourth, one should not forget that several countries had very poor initial social indicators in terms of employment, long-term unemployment or GINI coefficients and it will be difficult to make the necessary adjustments from their current level of disparities.

The country monographs have documented that, perhaps with the exception of Cyprus and Malta, regional and social disparities have recently increased. Due to the presence of structural problems, reform and streamlining of public services and the uneven effect of EU accession, it may be expected that most New Member States and Candidate Countries will face a period of increasing social disparities. The extent of this depends on the speed of structural adjustments and the ability of the countries to absorb external funds, both private and public.

## **11. Demographic stocks and trends**

The overall demographic picture of the New Member States and Candidate Countries is quite close to that of the EU-15, with the notable exception of Turkey, in that most countries have an ageing population. The first wave of impacts, however, is expected to come a little later than in Western European countries, as today these countries still benefit from a sizeable younger generation entering the labour force.<sup>33</sup>

However, the financial and social consequences of an ageing society will affect these countries in the mid-term in a way similar to the former Member States. The window of opportunity for the New Member States and Candidate Countries is between now and 2010/2015. They must take advantage of the emerging young and competent labour force to build up their economies and public finances, while solving the longer-term issues of pension and health care through adequate reforms.

Pension schemes and exploding health costs have to be kept under control, and the shrinking labour force, which affects both production and public finances, needs to be handled too. Ageing must be tackled before it affects these countries, and impacts indirectly on their capabilities and resources in terms of IS developments.

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<sup>33</sup> Its obvious competence for technologies is a major asset in comparison to former Member States, where the re-training of the older generation to new production processes is seen as an important difficulty.

Finally, the demographic data also have to be looked at from a regional point of view. The emergence of rapidly ageing regions may weaken the social cohesion of countries and be reflected in related IS indicators. The apparent low mobility of populations and the strength of their traditional networks (family, friends, village, church, etc.) may positively counterbalance the risks related to the concentration of wealth and activities in capital cities.

While they still have an acceptably young profile, most of the countries analysed will share the EU-15's challenge of overall ageing of their societies. The Central European countries face the biggest challenge with their ageing societies in reforming their health care and pension systems. Up until now, structural reforms have been delayed or only partly implemented. These delays may be paving the way towards a major public finance crisis.

## 12. Summary and conclusions

The factors reviewed affected Information Society developments in the individual countries in variable and country-specific ways during the previous decade. During this period, the New Member States and Candidate Countries faced the process of transition and accession which shaped their policy priorities, and at the same time they had to deal with past legacies. As a result, high growth and changing consumption and investment patterns occurred in parallel with painful economic restructuring and growing social divides.

Transition itself made the 10 Central and Eastern European countries a specific group, with its own characteristics: privatisation trends, strong reshaping of institutions, changing markets, and macroeconomic difficulties. After initial and country-specific years of transformation-related recession, all countries have witnessed GDP growth within the overall but slow process of real convergence. This in turn transformed consumption and investment patterns, bringing them closer to the pattern of advanced countries and fostering increased spending on ICT.<sup>34</sup>

Country size may also have mattered. As FDI and the accompanying know-how have played an important role in ICT sector development and in the technological modernisation of other sectors, its relative size compared with the size of the domestic economy gave it the opportunity to generate strong transformation, or remain limited to specific sectors, geographical regions, etc. Education levels have influenced FDI attractiveness and overall take-up of technologies by the corporate and household sectors.

Policies and public administrations have not always been able to follow the trends. Regulatory arrangements were too weak to create competitive telecommunication markets, and public IS developments remained underfinanced and were given low priority on government agendas, as regards both access and content.

Legacies are also country-specific and might be industrial or agricultural, regional and social, or may be linked to the lack of diversification of products or markets. While the shift towards services has been general, there remain many differences between the economies with questionable outcomes: they may either become a source of specialisation or a burden.

All such elements have, at least indirectly, influenced IS developments and they emerge as an "explanatory context", relevant for explaining the circumstances of IS policies. They can also help us understand how and why some countries are better positioned today than others as

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<sup>34</sup> Notwithstanding this convergence, even the New Member States remain a heterogeneous group in this aspect, with very variable available financial resources

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regards IS indicators (See Chapter II). In the case of the Czech Republic, the strength of IS indicators is partly an outcome of the relatively well-developed industrial and services sector inherited in the early 1990s. This good heritage was strengthened by the qualified labour force, which helped increase ICT production when the privatisation and other policy preconditions were met. The Czech Republic also had more balanced income distribution across its regions than the majority of the New Member States, which allowed it more equal and broader access to IS applications and use.

In Estonia, liberal policies and the recognition of the importance of the Information Society were the major driving forces. While the country has certainly inherited mixed assets (low development levels, Russia-oriented economy, but good geographical location, macroeconomic stability, and an adaptable labour force), the pragmatic approach to liberalisation, opening, and privatisation created the background for integration to the “Scandinavian industrial cluster” and the generation of a lively ICT sector. At the same time, centrally driven IS policies supported and drove broad-based access and spread of IS technologies.

In Hungary, the inherited assets (earlier economic reforms, a well-trained labour force, and certain industrial legacies) were important together with a very pro-active investment and FDI-oriented policy. The competitiveness advantages led to huge increases in ICT production and the country was able to maintain its advantages even recently, notwithstanding growing competitiveness problems. On the other hand, economic disparities and insufficient policies prevented the use of information technologies and services from spreading as fast as their supply and production.

In Slovenia, high and relatively equally distributed incomes, and milder social problems have been the factors explaining the good performance in IS indicators. The country has been able to manage the social and income divide better and to proceed faster with the reform of the public sector, and recently took a more open approach towards privatisation and other structural reforms.

Malta has utilised its advantages in terms of income level and, like Slovenia, smaller social and regional divides (as in the case of Slovenia, this was also due to the smaller size economy). An open policy towards FDI and a skilled labour force have resulted in an increase of ICT production.

Linking the analysis of Chapter II with the strengths and weaknesses presented above, leads to several conclusions concerning the role of certain factors in fostering IS developments.

The analysis of the factors shows that there have been real differences between the 5 “leading” countries above and the others, which explain the better performance of the former group. These are the following:

- better structural, economic legacies which resulted in less costly (except Malta, Turkey and Cyprus, which were not transition countries) structural reforms, smaller social and regional divide, smaller social costs,
- positive approach to privatisation, liberalisation, acceptance of foreign direct investments (except Slovenia till recently),
- location has also been important: all five countries are close to major markets and sources of FDI inflows and therefore they have been better integrated than others to the European production networks,

- early policies, more focused on IS developments, played an important role,
- Less social and regional divide was also important on the demand side.

While these factors have been important per se, country experiences show that besides inherited or acquired assets, there is the room – and the need - for Information Society policies to make a difference in IS developments. Estonia is a good example as the country had bad assets at the beginning of the transition, but well-designed policies. Specific measures allowed it to transform itself into one of the leaders in IS developments. However, few countries have identified the necessary policies in time and applied them appropriately. It can be said that assets have so far contributed more than IS policies to the development of the Information Society in most of the thirteen countries.



## CHAPTER IV: INFORMATION SOCIETY POLICIES IN THE NEW MEMBER STATES AND CANDIDATE COUNTRIES

Information Society policies have been developed at national level in all the New Member States and Candidate Countries. However, several common elements can be highlighted in two policy dimensions: the content and institutional setting.

The content dimension can also be divided into two major parts: the Direct Information Society policies, which directly affect the development of Information Society: awareness-raising actions, measures supporting ICT access to infrastructure and equipment, government programmes on digital content development or improvement of the ICT knowledge base; the Indirect Information Society policies which influence Information Society developments by improving their framework conditions: telecom privatisation, regulation and competition policies, taxation schemes and investment promotion, R+D and education policies. One could say that direct policies influence mainly the demand side of the Information Society, while indirect policies generally rather impact the supply side (the ICT sector).

The second dimension - institutional setting - relates to the organisational framework in which policies are developed and implemented. It implies government coordination, presence of local or regional institutions, involvement and cooperation with the private sector through public/private partnerships (PPP).

### 1. Direct IS policies

The general features of direct IS policies in New Member States and Candidate Countries can be summarised in the following points.

- 1. Shifting importance of IS related policies.** There has been a gradual shift in the importance attached to Information Society developments on the political agenda. The first half of the 1990s was characterised by a relative unawareness of IS policies at government levels. Four factors diverted in the last decade the attention of governments from coherent and unified IS policies: the structural and macroeconomic problems of transition to market economy accompanied by the strong lobbying power of interest groups, the continuous pressure from public deficits, the slow progress with public finance, institutional and human capacities reforms, and the strong priority given to the implementation of the *Acquis* reducing the amount of funding available for ingenious IS developments.

As a result, with some exceptions (Estonia, Slovenia) most countries started to develop independent and coherent IS strategies with delays and only some elements of Information Society development can be found in the programmes of functional/branch ministries. In some other countries programmes were present but governments either did not pay enough attention to them (Slovakia, Lithuania) or they were of less relevance to IS developments (Hungary).

But the process of enlargement, the effect of IS-related EU programmes and the accession itself mobilised governments to increase the weight given to Information Society issues. In more recent years, governments started to record the existing gaps, while the pressure from structural problems eased and more attention was directed to IS policies.

As a result, in the last 5 years more was implemented than during the whole decade and a much more comprehensive approach was taken. This increased awareness was reflected in more specified programmes: governments defined IS policy targets and priorities, established programmes outlining future IS developments and determined their ways of implementation. These documents and policies reflect the revised attention devoted at government levels to IS policy as they have become an integral part of government policies. Moreover, the strategic documents have been followed by direct and concrete policy measures assigning specified targets, tasks and also budgets for the implementation of the programmes.<sup>35</sup>

**Table 5. A summarised view on early IS policies across the New Member States and Candidate Countries**

|    | First IS policy  | Year |
|----|--|------|
| BG | National Strategy for the Development of IS (name)           | 1999 |
| CY | Information Systems Strategy                                 | 1987 |
| CZ | National IS policy   | 1999 |
| EE | The Estonian Way to the Information Society                  | 1994 |
| HG | Informatics Infrastructure Development Programme             | 1986 |
| LV | Long-term Economic Development Strategy of La                | 2001 |
| LT | Lithuania 2000   | 1992 |
| PL | Proclamation on Information Society in Poland                | 2000 |
| RO | National Strategy for the Information Society                | 1997 |
| SK | Concept of Communications Development in the Slovak Republic | 1993 |
| SL | Blue Book  | 1999 |

*Source: Country Monographs*

- 2. Mobilising effects of EU accession in the NMS.** The accession to the EU has generated its own impact, influencing part of the national policies or at least facilitating the decision-making processes on some subjects. In several countries, beyond the effects of benchmarking and exchanging experiences initiated by the eEurope+ action plan, national IS policies have taken on board the objectives, actions and indicators developed in the successive eEurope Plans, initially designed for the EU-15 Member States.

The participation in and demonstration effect of EU programmes and goals (eEurope, Lisbon target) became more pressing and more attention was directed to developing appropriate IS policies. The mobilising effect of EU accession was felt in the adoption of regulatory changes, in harmonising the rules affecting Information Society developments and in aligning policies with the EU ones.

- 3. Close reflection of eEurope initiatives in government policies.** In the analysed countries the goals of national IS policies reflect the eEurope initiative and are in compliance with general European trends both in terms of targets and instruments of implementation. This allows policy makers to develop policies in line with the European trends, and strongly facilitates EU compliance and the full participation in benchmarking exercises.

There are two problems with these goals however. First, there is still a simplified understanding of IS policy among political and administrative bodies: for example the

<sup>35</sup> However, some of the Country Monographs still note the absence of such action plans for IS, backed by specific budgets and implementation provisions.

major driving factors towards IS developments, as growth potentials or digital divide risks, are sometimes ignored or misunderstood. Second, even with goals coherent with European ones, policy makers need to understand the special features of their countries in terms of level of development, private sector activity, structural features and driving forces of economic growth. With similar long-term visions, policies should be targeted and adapted in countries with different development levels, specific penetration rates, and in general, IS use standing at a fraction of EU-15 average levels.

- 4. Generally limited public funding for IS initiatives.** Public sector IS initiatives could have played an important role in the expansion of IS, but in comparison to the private sector, their contribution have been low due to fiscal pressures, general lack of political and managerial awareness about the potential benefits of IS developments and IS policy weaknesses. The lack of public funding is observable in various areas. First, governments both at the central and local levels did not attribute sufficient resources for content developments in the public sector: the digitalisation of public services is low, the content on online services is weak, ICT penetration rates in the public sector are low and the ability to handle administrative procedures is constrained.

Second, the low availability of funding to upgrade existing human and physical capital in the public administrations contributed to the differences in IS development. Where more funds were devoted to the expansion of human capital, infrastructure and equipment, ICT use could flourish much more rapidly, when comparing across countries and administrations.

Finally, the lack of funding reduced the scope for public initiatives which could have additionally boosted ICT investments (and thus domestic companies, including through public procurement), encourage use among households and companies and improve internal efficiency of the public administrations.

- 5. Fragmented direct IS policies.** As IS policies have never been on the top of policy priorities they were generally treated as a residual and governments generally lacked an appropriate and coherent policy strategy. IS policies remained fragmented and dependent on other policy outcomes: detailed action plans have sometimes been missing or remained incoherent, general policies and priorities have not been co-ordinated with the targets of functional/branch ministries. Fragmentation is costly in terms of lost funding, conflicting goals and reflects the usual tensions between spending ministries themselves, spending ministries and Ministry of Finance, and if the government has centralised bodies (Prime Ministers Office or any other high ranking authority) responsible for IS developments between them and other branch ministries.

Furthermore, there is still an obvious lack of appropriate funding sources both at national and especially at regional levels and a relatively low priority given in the budget discussion to IS developments needs, as compared with other ministerial budgets. Governments have generally been unable to link structural problems (health care and education, local governments, public administration, etc.) with IS solutions that could have helped both in the reforms of public finances and in spread of IS applications.

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**6. Gradually improving attention to access.** Until the late 1990s most governments did not devote much attention to access to Information Society services and technologies. Access means two simultaneous things. First, that governments support indirectly the demand for Information Society technologies by stimulating the access of households to hardware and software: examples include tax deductions or supported lending in case of IS related investments, direct support to specified target groups (teachers, disadvantaged groups, etc.). Second, it also means that besides private sector initiatives, governments are actively involved in creating the supply side of these services: investment in public access points is one good example. In those cases governments act through financing and providing these services. They also have a role to play as regulators as they can influence market conditions, competition, price setting behaviour, market entry and exit conditions, which directly feed back to the promotion of access to IS services and technologies.

There have been government programmes in the aforementioned areas, most notably in the Czech Republic, Estonia and Slovenia, but these measures did not form a coherent strategy and several other obstacles (weak regulation of incumbent operator) neutralised the government policies. In recent years this neglect has been revised and more attention is devoted to access.

**7. Poor results with content policies.** Information Society policies have little targeted and developed initiatives towards the digitalisation and use of public sector content. With the exception of Estonia and Slovenia, eGovernment initiatives remain rhetoric, and only few measures have been implemented to accelerate their emergence. Both the New Member States and Candidate Countries have significant gaps in eHealth, eTax, eLearning areas as compared with the EU-15 countries, as in this case even the development of programmes, the establishment of legal background has frequently been missing. As the foundations are inappropriate, the content of online information provided by public authorities is scarce, and most applications have passive structure and design.

With some exceptions government policies did not devote enough attention to this both at the central government and local/municipal government levels. The reasons of this insufficient public sector content are partly financial, partly managerial (lack of awareness and skills) and partly due to the lack of critical mass of users.

These areas would however be very important for development, as digital content improvement and reform of public services could be connected with positive spill over effects. In the New Member States access to EU funds may accelerate this development, as eGovernment and content development have been determined as one of the key priorities in their National Development Plans, and more external funding may also overlap with more domestic sources given for this purpose.

Summarising the direct IS policies the following conclusions can be made:

1. There has been a shift in time in preferences devoted to IS policies: initial neglect has been replaced by rising awareness in recent years
2. EU accession had a mobilising effect on NMS
3. IS policies have been increasingly driven by and aligned to EU policies and goals
4. However, policies remain fragmented and under-resourced

5. There has been a change in access policies as governments increasingly support it
6. However, content development in the public sector remains very limited.

## 2. Indirect IS policy measures

Indirect policy measures are mainly linked to the production of ICT: privatisation, investment promotion, tax policy, and innovation and R&D policy. Similarly to the differences in size of ICT sectors, policy performances of countries differ too: some have implemented more radical policy measures, while others lag considerably behind, which reduces the scope of general conclusions. Some indirect measures are related to access to IS technologies and services: regulation and education are two important policy elements in this area.

1. **Investment policies:** all countries benefit now from liberal and stimulating policies in the area of investment. This refers not only to foreign direct investments but also to investment by local enterprises, particularly in the SME sector. This is embedded in the tax regulations, and aims at providing as much as possible public support and aid for local investments, while keeping them in compliance with EU regulations. It has also boosted competition to attract foreign direct investment, in general and in the ICT sector in particular.
2. **R&D and innovation policies:** the case of R+D policies is more complex. Funding is lagging behind both in case of private and public sectors, the necessary policy measures stimulating private sector R+D expenditures being absent or insufficient. In many countries the existing R+D budgets seem to be rather allocated to insufficiently productive research institutions, and the co-operation between public and private research, in particular in market oriented applications is scarce. The R+D sector needs to be restructured in line with rethinking the innovation policy, a trend which is slightly observed in most countries. The role of technology in the economy, in particular of ICT, has still to be defined in terms of improved competitiveness.
3. **Regulation and Competition policies:** regulation and competition policies would have been the most important instruments but they have given insufficient support to IS developments in New Member States and Candidate Countries. The major problem has been the lack of appropriate regulatory power to reduce the market power of incumbent telecom operators, who have been able to utilise their strong lobbying power to keep their market positions and prevent competition on their markets. This has been a major weakness in government policies and affected strongly IS developments in basic access indicators.
4. **Education policy:** Finally, the analysed countries have generally inherited well-developed and competent education systems, whose benefits are still observable, while there are numerous emerging problems, which gradually feed negatively back. First, funding for education is declining in relative terms as compared to a decade ago. Second, in many countries, there is an unfavourable shift towards more funding provided to tertiary education at the expense of primary and secondary ones, which creates mismatch in labour supply and demand. Third, curricula developments lag behind current requirements, reflected in worse results of students in international comparisons. In all three aspects, these affect directly the potential for essential IST developments in the educational system. Beyond these general trends, specific issues are also observable in terms of ICT skills mismatch, insufficient introduction of technologies in Education, etc.

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Summarising the indirect IS policies the following conclusions can be drawn:

1. ICT production has been favourably supported by strong investment promotion (FDI and domestic).
2. Further spread and especially increase of higher value added ICT production depends on R+D expenditures, innovation policies, which are far from the required levels. Support to the future competitiveness of other sectors of the economy also depends on a better setting for innovation.
3. Weak regulation and lack of competitive market structures have been major weaknesses undermining the developments of better access rates.
4. In the education system, lack of funding, emerging imbalances and qualitative problems also weaken IS developments.

### 3. The institutional setting

1. **Coordination and commitment:** In the 1990s there was a lack of coordinated public and coherent strategies in most countries, with some exceptions (mainly the Baltic ones). Recently, this institutional setup for IS policy changed towards the establishment of independent institutions (a ministry or a high level committee) being given the task to co-ordinate and lead the work. Moreover, in some countries IS policies have also been delegated to higher governmental levels including the Prime Minister's Office or another institution that has the ability to co-ordinate IS-related policy issues at the inter- ministry level. The creation of these new institutions is a positive step compared to the previous situation, when nobody was the "committed owner" of IS policy. Still, those bodies have often been established with low budgets and scarce staff, their voice within the government remains weak compared to the strength of other spending ministries. Due to the absence of a competent and legitimate body to represent the IS challenges and goals, IS initiatives always were devoted rather small shares in national budgets, or large shares that were later not committed.
2. **Regional policies:** Another institutional weakness has been the absence of regions in the formulation of IS policies. This is indirectly linked to the state of public finances and the lack of consensus in many countries on how to reform public administration and manage the relationship between the different levels of government. Consequently, the absence of relevant regional-level IS policies is a major issue with broad implications. National governments do not have always developed visions and policies for regional IS developments, while regional authorities (even at the NUTS-2 level) do not necessarily have the appropriate power and means to prepare those regional IS policies. Together, authorities have not allocated relevant budgets for their own policies and for co-financing of IS regional programmes linked to Structural Funds. Last but not least the issue of national/regional co-ordination is often unresolved.
3. **Domestic cooperative settings:** Another serious institutional weakness is the weak co-operation between government institutions and the private sector or the civil society. While the private sector has generally been actively supporting IS policies and programmes, most governments have so far been unable to establish a well

functioning relationship with it. There has been an increased reliance on public-private partnership programmes (PPP) in many public services (health care, education sector among others). While these programmes have their drawbacks and need many institutions and elements to be in the right place (appropriate regulation, procurement rules, transparency of decision making and operation, continuous monitoring and oversight, etc.) which are not always present in these countries, they may involve more funding from the private sector, more control over public spending. So far IS programmes have benefited less from the PPP initiatives.

4. International Cooperation: At international level, the accession to the EU, together with the eEurope+ action plan and benchmarking exercise, have been important factors driving to the adoption of national IS policies. With the accession in the background, governments have acknowledged that the future development of IS will crucially depend on the way EU regulations are adopted in their country and EU funds are absorbed and therefore they have taken several pro-active measures to prepare to those changing conditions.
5. But, little has been achieved in terms of other multilateral international cooperation. Some initial trials among New Member States (at Visegrad, as well as at Baltic level) have until now reached little achievements. The benefits of cooperating to gain economies of scale, test international solutions and voice as a group in international institutions are still not at hand. On the contrary, the Scandinavian/Baltic alliance is an obvious example of shared goals and achievements and might pave the way for other similar settings.

Summarising the institutional set-up, the following conclusions are the most relevant:

1. As an outcome of enhanced attention of policy makers to IS policy issues, there has been an emergence of IS co-ordinating and legitimate bodies at national level,
2. There has, however, been a general lack of co-ordination with regional authorities,
3. The private sector and the civil society are rather neglected or underestimated in national or regional cooperation settings; there is also a lack of PPP initiatives,
4. There are few efficient co-operative agreements at international level.



## CHAPTER V: FUTURE SCENARIOS, POLICY TARGETS AND INSTRUMENTS FOR IS DEVELOPMENT

This last chapter gives some thoughts on those trends in Information Society developments in the New Member States and Candidate Countries which are most probable, and which will shape future policy targets and instruments. Though current levels of economic and IS development, legacies and structures and future catch up potential are country-specific, there are certain common trends that shape IS development, in terms of use and of production. First these common trends are presented, followed by an assessment of those policies that could achieve visible progress in the Information Society indicators.

### 1. The likely scenarios for IS development in the New Member States and Candidate Countries

1. **Lisbon convergence.** Before assessing IS trends, it is important to make assumptions about the likely scenarios as regards the Lisbon indicators, as they directly or indirectly affect IS development in the New Member States and Candidate Countries.

It is expected that the gaps between New Member States and the EU-15 will narrow in most Lisbon indicators, but the speed of convergence will be country-specific. The indicators where most convergence will take place between now and 2010 are expected to be GDP per capita, labour productivity, business investments, R+D expenditures and spending on human resources.

Ongoing structural changes and persisting institutional weaknesses will prevent fast convergence in other indicators, including employment and older worker unemployment rates, long-term unemployment and regional cohesion. In these areas, slow convergence, or none at all, is expected. Moreover, in some cases – e.g. regional cohesion – fast catch up in a country may coincide with broadening regional differences within the same country's economy. With most indicators, convergence will depend on country-specific features.

2. **ICT sector in the New Member States and Candidate Countries by 2010:** The following prospects for the ICT industry might be expected under a “business-as-usual” scenario (all conditions being equal):

A. It is likely that the current inter-country differences in ICT production trends will remain, as economies with solid ICT production will maintain their advantage over the others. Spill-over effects, the presence of well established producers and other factors may accentuate this process. “Polarisation” in ICT production is thus expected to remain and grow as a result of “first movers” advantage. While there may be some countries that attract more foreign direct investments in this area (Slovakia and Romania are two recent examples) and increase their ICT production, it is likely that the others will not catch up and the Estonian, Hungarian, Maltese and Czech leading positions will remain unchallenged.

B. The enlargement of the European Union will bring about new restructuring within the ICT sector. The unified enlarged markets will see changes in the geographical distribution of production, depending on the evolution of competitiveness factors. The process has already begun with ICT industry relocations from Western to Eastern

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Europe. These have been primarily linked to manufacturing activities, but there are also some cases of service relocations. In the longer run, the internal division of labour in ICT production between the EU-15 and the New Member States may change significantly. The New Member States could be competitive enough to attract some ICT investment away from the EU-15 and Enlargement could result in a stronger (even if provisional) relocation of ICT production within the EU-25.

C. An expected development, related to the above, is that Central and Eastern European countries will be forced, as a result of increasing cost competition with other middle-income countries, to change their ICT production to higher value-added product niches.

While production relocation is taking place within the enlarged Europe, there are also moves away from Hungary, Estonia, Malta or Czech Republic to Ukraine, South-Eastern Europe and to Asia (mainly China). Though this could be a potential challenge as these moves could represent a possible restructuring of the global division of labour under market conditions, the “flying geese” effect of IT production in the New Member States and the Candidate Countries is unlikely to happen. Either wage-based production will completely lose ground in these countries and will be deployed to other regions with competitive wages, or higher value-added capacities will be established in the leading New Member States and Candidate Countries.

D. The consolidation and development of the ICT sector will strongly depend on general macroeconomic and structural conditions and on the development strategy chosen by the individual countries. As explained in previous chapters, it is likely that three different patterns of ICT development will emerge:

- a) In some cases, the consolidation of domestic ICT companies could take place in niche (service) markets at global or at least regional level. This refers to certain companies and countries which have special advantages (like the Slovenian or Bulgarian producers) over the others due to their production skills, economic, linguistic and other advantages.
- b) The small open economies (which derive their economic growth from the expanding ICT sector) will retain ICT sectors that are relatively more important to their national economies than the eight other countries, which have ICT production sectors of small relevance. Ongoing FDI, structural upgrading, and the pressures of serious external competition will help these countries to maintain their relatively good position.
- c) The large countries in the sample are expected to develop their own markets. Poland may depend on the stability of some of its local advantages – i.e. natural, geographical, etc. Romania may build up its role as a software developer. Turkey will maintain its important consumer electronics manufacturing plants (exploiting the huge potential of its local market, which will, at the same time, act as a buffer during cyclical export market crises), and the progressive rise in wages might help the evolution towards other types of more added-value production.

E. The creation and maintenance of a local and a foreign-owned production capacity, delivering mainly, if not exclusively, telecommunications, software and computer goods and services to the domestic market, will be observable in all countries, closely

linked to their market size and their average revenue growth. ICT trade balances are expected to remain negative, due to important imports of ICT manufactured goods and slow upgrading of the existing production facilities.

3. **ICT Use.** It is much more difficult to analyse ICT use than ICT production. While the latter can be treated as a sector of the economy, ICT use requires a quantitative and qualitative analysis of ICT penetration rates, access and use. It also needs to take stock of the different behaviour of households, businesses and government institutions, and has to consider both content production and human capabilities. The national reports have covered this scope, and allow some conclusions to be drawn.

First, time series data show positive developments. The speed of expansion of both the use and supply of ICT has significantly increased in recent years in most New Member States and Candidate Countries. Moreover, the still low levels of ICT consumption, investment and output have been rising faster recently than they did in the second half of 1990s, and ICT spending relative to GDP is now higher in these countries than in the EU-15. Governments are devoting more attention to this kind of investment than they did in the late-90s and this should also contribute to a continued increase of ICT use.

Over the next few years, the gaps between the New Member States and the EU-15 in IS indicators, mainly in terms of access to Information Society technologies, can be expected to narrow. Income convergence, structural and societal changes, and also government programmes with more funding and a new approach to increasing access rates, will contribute to reducing existing gaps.

Moreover, it is likely that all countries will gradually reach or approach the critical levels needed for accelerated IS development, which - as a side effect - will accelerate growth further (penetration rates, use of broadband, access to higher quality private and public sector content, regular use of eServices, etc.).

Secondly, notwithstanding these developments, current figures reflect significant gaps within and between the New Member States and the Candidate Countries and the EU-15. All the New Member States and Candidate Countries' penetration rates are lower than the EU-15 average. Though convergence towards the EU-15 average is taking place, the process will remain highly uneven as not all existing gaps will narrow in the future - in fact, some may widen significantly.

While the New Member States and the Candidate Countries as a group may converge towards the EU-15 averages, it is less likely that the inter-country differences between them will significantly decline. As with ICT production, though some countries may progress faster, the leaders in this area (i.e. Slovenia, Malta, Cyprus, and, to a lesser extent, Estonia and the Czech Republic) will continue to maintain their advantages over the others in the future. In most of the IST indicators, it is more time consuming and costlier to reach a real breakthrough than in ICT production, due to the fact that societal attitudes and government policies also need to change.

Macroeconomic developments, structural changes and dynamics and composition of economic growth will further widen the existing gaps within each country, between different IS users (age, education and income levels), organizations (different sizes), and regions (rural and urban). While social divides are widening, the development of

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new technologies adds further complexity to these divides due to the purchasing power, infrastructure, skills, etc. required for accession and benefit from ICT services.

## 2. The shifting targets and instruments of IS policies

### 2.1. The targets

Based on the current levels and likely patterns of development presented by the country monographs, there are some key targets that policy makers should consider as top priorities. These priorities, and the progress in indicators measuring their status, are of key importance if faster progress in Information Society developments is to be achieved. Five main targets have been identified. Their relative importance varies in each individual country, due to country-specific features.

1. ***Making broadband a key priority.*** One of the key areas is broadband development. Its current low level of development in the New Member States and the Candidate Countries reduces the quality of access of households and broad segments of society to Information Society services. At the moment, the most popular way to access the Internet is still through dial-up connections. The main policy challenge for governments is to support the switch from narrowband to broadband networks, which provide high-speed and always-on access to the Internet. So far, very little progress has been made at corporate, household and public sector levels.

This switch is important as access to broadband promotes the use of the Internet. This spills over to eBusiness, eLearning, eHealth and eGovernment, improving the functionality and performance of these services, and further extending Internet use.

2. ***Improving supply and content of eGovernment services.*** The second priority area for the New Member States and Candidate Countries should be the improvement of both the quantity and quality of eGovernment. Access continues to be a key problem for public institutions and services, and content development lags considerably behind the private sector. Governments therefore need to devote more funds to increasing the scope and availability of online public services, and to improving the content quality of their eServices. This could be done directly in central government institutions, and through fiscal and other support in regional and local governments.
3. ***Supporting broader and easier access to IS services by households and SMEs.*** A key priority for the development of the Information Society in forthcoming years should be a considerable increase of access to online services by households and SME sectors. A major barrier is the price of access, in terms of computers, Internet access and phone charges. Government policies need to address this, and to increase substantially the number of households online and the number of SMEs actively providing services and managing their businesses through the Internet.
4. ***Increasing public and private sector spending on Information Society.*** Currently both the public and the private sector (at both corporate and household level) in the New Member States and Candidate Countries spend a much smaller fraction of their incomes on ICT than they do in advanced countries. A key priority is to increase spending on ICT services and goods in order to stimulate local markets and to improve access conditions. Government spending (as described below) should be increased, especially at local and regional levels. The corporate sector should be encouraged to

spend more on IT developments, purchases and online business activity, while households need to increase the share of their disposable income devoted to IS applications. Many factors could encourage this shift towards higher ICT spending: price developments, income convergence, regulations, content development, etc.

## 2.2 The policy instruments

In order to achieve the set targets, governments need to apply appropriate policies. These are divided into three sets of instruments: policies with a direct influence on the Information Society, indirect ones with a similar orientation, and ICT-related policies.

### 2.2.a. Direct IS policy instruments.

1. ***Prioritising spending on IS development.*** An important priority for direct IS policies is the double task of increasing the funding available for IS developments, and, at the same time, making better use of existing resources. Policies so far have concentrated on too many targets with too few resources and the outcomes have been disappointing. More funding could become available if there were a shift in public sector spending towards IS applications and areas that could stimulate their use (R+D, eLearning, education, etc.). As levels of public spending are already high and distorted, the only way national funds could be increased is by public sector reform and the reduction of spending on current items.

Moreover, the New Member States should make more effort to increase the amount spent from Structural Funds on IS applications and policies. While the amounts are fixed under the current budget cycle, countries may increase spending in the forthcoming one. The New Member States should broaden spending on IS policies and ensure greater territorial cohesion through the use of Structural Funds. However, all the New Member States have drawn up their National Development Plans to target – at least according to the available information – other priority areas (environment, regional cohesion, highway construction, etc.) more than the Information Society. Therefore a sharper focus in development plans is needed to utilise more co-financed resources for IS developments.

Governments need to channel more resources to certain critical areas to achieve a breakthrough. They also need to encourage synergies between these areas, which could bring about fast progress in several key indicators. Resources should be concentrated on supporting broadband, increasing digitalisation of public services, improving their content, and widening access to Internet and IS applications in the households and SME sectors, while spending on others areas should be reduced.

2. ***Shifting the focus of IS policies.*** As regards direct IS policies, governments have several policy instruments, depending on the sectors they target (government, households, business). They need to change the focus of their IS policies and their institutional settings from pro-business to pro-consumer. In the majority of the New Member States and Candidate Countries, Information Society policies were influenced by the preference given to major business groups, incumbent providers or alternative operators. This is no longer sustainable and government policies should be oriented towards consumers by improving their access to ICT, reducing the barriers to and costs of access.

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As described below, governments have two ways of achieving this goal. Firstly, they could use incentives more broadly to reduce access costs: deregulation, tax credits to households for ICT investments, supply of public access points, and coherent regulation of amortisation expenses could be the major instruments. Secondly, they could directly promote eGovernment services, and improve the quantity and quality of content in the public sector.

3. ***Providing more funding for regional and local governments.*** An important policy issue for the New Member States and the Candidates Countries is giving more power and funding to local and regional governments, which could make more extensive use of their access to local issues and support local initiatives in order to counterbalance the dominance of central government policies. Local and regional policies could be more effective in narrowing the existing social and income disparities, which are the major reasons for the digital divide. The allocation of more resources from central government budgets to regional cohesion could also help to counterbalance these divides. Regional policies, especially ones co-financed by the European Union, should have a much stronger focus on IST-related developments and funding.
4. ***Strengthening local governments' administrative capacity to utilize EU funding through training and close supervision of progress.*** A related priority is to strengthen the administrative and coordinating role and capacity of local governments to utilise the available EU Structural Funds. While there is a shortage of appropriate personnel capable of administering and managing the inflow of increased funds at various levels of government, this problem is especially acute at local and regional government level. An important priority for IS policies is to improve the quality and increase the quantity of available administrative staff at lower levels of government. The main policy targets should be fast technical and administrative upgrading for broadband, improvement of public sector eContent (much broader applications in eGovernment) and increased access by households. Resources should be concentrated on these issues. There is also a related need in most countries to adjust their existing organisational and management structures. Besides decentralising funding possibilities and responsibilities to local and regional governments, the administrative and coordinating role of the branch ministries in the implementation of IS policies needs to be strengthened.
5. ***Developing and implementing forward-looking and "aggressive" broadband policies and strategies.*** Governments in the New Member States and Candidate Countries have endorsed the eEurope 2005 Action Plan, which asks for 'widespread availability and use of broadband by 2005' - an important objective for IS policies. They have developed their national broadband strategies, which determine the main areas of development, and have tried to connect these with the available funding sources. Now they need to proceed with the implementation of these policies and effectively increase the amount of spending on them.

According to the principles laid down in the eEurope 2005 Action Plan, the availability of broadband can be stimulated by supply-side policies based on greater competition and handling of market failures, while use is encouraged by demand-side policies targeting the development of applications, content and services.

As regards availability, governments need to take several steps. Firstly, they should support, in the short-term, the upgrading of the existing technologies which provide access to broadband, including telephone copper networks using ADSL technology, and cable TV networks using cable modems. In the New Member States and Candidate Countries, these technologies require the upgrading of existing networks. At the same time, governments should stimulate competition and allow faster access by users to new infrastructures such as fixed wireless access, third-generation mobile systems or satellite. In these areas, their main role should be to create, and afterwards maintain, competition between the different service suppliers.

A second policy instrument would be to promote the deployment of broadband by various incentives and funds. This is especially necessary in less densely populated areas, where there is no supply-side incentive to provide the services, or where the market sustains only one infrastructure provider. In this case, according to the provisions of eEurope 2005, governments could devote an increasing share of their national funding, and use Structural Funds or regional support to increase infrastructure availability.

On the usage side, most governments could act by developing and digitalising public administration and public institutions (including, amongst others, hospitals, education units and schools). This would also be in line with the provisions of eEurope 2005, which has set the end of 2005 as the target date for reaching this goal. More public funding, the implementation of a forward-looking national strategy, and respect for the principle of technological neutrality will be necessary to achieve this goal, along with open tender procedures for project selection.

### 2.2.b. Indirect IS policy measures

Besides direct measures, governments may also apply indirect policy measures to support IS developments, primarily to reduce disparities in access and digital divide.

1. **Providing balanced and sustainable economic growth.** The provision of stable economic growth and macroeconomic conditions is a *sine qua non* for the spread of the Information Society. The causality between growth and IS developments is two-sided, fast and sustainable economic growth creates the demand and supply side factors for higher investments and resources spent on ICT. It increases disposable income, improves the affordability of ICT services for a wide segment of users, and, if accompanied by competitive markets, raises the demand for ICT investments in the corporate sector.
2. **Public finance reform and restructuring of fiscal expenditure.** An essential indirect IS policy is the acceleration of public finance reform. In most of the countries analysed, it means a change in the institutional, ownership, and structural framework of the existing education, healthcare, local government, and public administration structures. These reforms should reduce the scope of public sector, make it more efficient and reduce the current levels of tax required to cover these expenditures. Public finance reform could accelerate Information Society developments in three areas.

Firstly, the reform should reduce public spending and the tax burden, thus leaving more funds in the private sector. Secondly, it may be expected that after the learning period, the quality of service in education, and health care and the quality of public management will improve, which could accelerate economic growth, provide more social cohesion and

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more equal access to public services. Thirdly, these reforms should be loosely linked to ICT-related innovation in the public sector, which may increase the scope for content development in public entities. Two critical areas in this respect are health and education reform. Health reform could be closely associated with the spread of eHealth services, while educational reform could put much more emphasis on the supply of ICT-skilled graduates, as well as on the demand for ICT-related services (eLearning, etc.).

3. ***Increasing and shifting the composition of public R&D.*** One weakness of the New Member States and Candidate Countries is the low level of GERD and the high share of public R&D in total. However, even though public R&D is high in total compared to the EU-15, its share in GDP is lower. Therefore, the New Member States and Candidate Countries should devote more public money to research and development than before. This should not be done by increasing private sector taxation, but by restructuring public expenditure. Public R&D funding should also be better targeted and resources should be shifted from non-applied to applied research. Additionally, these funds should stimulate - through financial incentives - cooperation between public R&D and research institutions and the business sector.
4. ***Providing better regulation to stimulate competition in the telecommunications market.*** Inappropriately designed or implemented regulation policies have constituted a major weakness in IST-related policies in the New Member States and Candidate Countries. This weakened competition in their telecommunications markets. They should therefore complete their adoption of EU legislation and efficiently enforce existing competition policies in order to create competitive markets in both fixed-line and Internet services.
5. ***Promoting competition in the product markets.*** Competition policies and an appropriate regulatory framework are needed not only in the telecommunications market, but also in the product markets, as these could stimulate private sector ICT investment. More competition will bring more investment and the corporate sector will lay more emphasis on increasing its competitiveness through ICT-related investment. The New Member States' entry into the EU will strengthen competitive market structures and will provide more pressure on the corporate sector, but regulatory measures may also be needed in certain areas.
6. ***Broader scope for public/private partnerships - PPP programmes.*** Public sector reform and the streamlining of fiscal expenditure resulted in the spread of public-private partnerships (PPPs) in many New Member States. Countries have adopted the appropriate legal background for PPPs, and have started to implement PPP programmes. They plan to increase their use in order to achieve a better match between private and public funding - reducing, if possible, the scope of the public sector. While the appropriate and beneficial application of PPPs depends on several factors (existence and observance of public procurement rules, determination of those areas where PPPs can be used efficiently, etc.), several social and economic conditions in the New Member States and Candidate Countries may hinder their broader use (corruption, high inertia and resistance from public servants, etc.). However, they could provide a framework for involving the private sector in the improvement of access and content in the public sector. PPP programmes could be used in broader projects linking IS development and public sector reform, including eHealth, eTax and eLearning programmes.

7. ***Continued reforms in the education system.*** An important element in the support of the Information Society is the reform of existing education structures. This involves, among other things, increased emphasis on reducing functional illiteracy, increasing opportunities for lifelong-learning and prioritising ICT-related education of teachers and students. It is essential that the extent of ICT-related education in the curricula is increased and that it is started earlier. The reform of the education system also means changing the priority given to professional training, lifelong and tertiary education.

Special emphasis needs to be placed on increasing ICT literacy in the older generation and marginal or disadvantaged social groups. These measures would provide these groups with economic and social benefits such as better social cohesion, improved access to ICT services and improved employment opportunities.

Those countries which are strong in ICT production and are expected to maintain their position should increase the attention paid to the training of engineers and professionals for the ICT sector. As emphasized earlier, these countries can maintain their position in global ICT markets only if they move to higher value-added production. In order to achieve this, they need to increase the quality of the labour force and become more competitive in production involving higher human capital content. This requires more funding and more graduates with better skills adjusted to the expected changes in labour demand in the ICT sector.

8. ***More emphasis on reducing digital divide.*** Social disparities are affecting IS development. Inequalities in income distribution, high levels of long-term and structural unemployment, low levels of employment and activity rates are all factors which indirectly increase the differences in access to IST services and products. An important symptom of regional disparities is visible in unemployment rates, which directly weaken the spread of IST. Unemployment rates lead to cumulative social disparities, reduce the number of those who can afford access to Information Society technologies, and generally preserve existing social disparities. As long-term unemployment rates in these economies are also above the EU-15 levels, this is a significant factor which hampers the spread of IST in accession countries. Appropriate, functional, and regional policies could handle the growing economic and social disparities, which in turn could indirectly help in increasing the affordability of and demand for IST applications.

### *2.2.c. Policy instruments related to the ICT sector*

Finally, there are policy measures to improve the competitiveness and attractiveness of the ICT-producing sectors in those countries that are strong ICT suppliers.

1. ***Improving general business conditions by reducing and simplifying regulations, lowering taxes and spelling out laws.*** Besides providing adequate physical and human capital, governments could stimulate ICT sector competitiveness by providing a good regulatory framework. The recent problems with biased regulation, maintenance of monopolistic market structures, and slow progress with telecommunication liberalisation delay IS developments. In the case of ICT production, governments could implement a coherent regulation policy aimed at reducing existing market failures, monopolistic market structures and uncompetitive behaviour. Price regulation, competitive entry and exit conditions, growing competition between telecommunications suppliers, competitive markets for fixed-line and Internet service

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providers are key issues for policy makers. Competition fosters the expansion of ICTs and their applications and should be one of the main elements of regulatory policy.

In many areas, the New Member States and Candidate Countries are more flexible than the EU-15 (labour codes and regulation, speed of structural adjustment, etc.). Their economies, however, are inflexible. High production site costs, inefficient tax systems, high public sector redistribution in many countries, monopolistic market structures, etc. seriously constrain efficiency and flexibility. This in turn reduces investment, slows down income growth, with harmful consequences for IS developments. If these essentially structural weaknesses were addressed better than they have been in the past, this could initially boost ICT production and afterwards, it could also positively contribute to IS developments in general.

- 2. *Removing disadvantages for private R&D.*** One critical area for ICT development, and increasing the value-added aspects of ICT production, is the growth of the currently very low private research and development spending. Research and development expenditure has increased only moderately in recent years in the New Member States and Candidate Countries and is much lower than in the EU-15. Government policies could stimulate private sector research and development in three areas.

Firstly, as mentioned before, the provision of competitive market structures and appropriate regulatory policies keep the pressure on the corporate sector and force it to increase spending on R&D to remain competitive. Secondly, governments could provide more funding and programmes to involve the private sector in public sector-related innovation and research activities. These should include support for start-ups, provision of technological and innovation centres, more extensive cooperation between public universities and private firms, and the completion and management of research and development programmes in the private sector. Thirdly, they could give better tax and depreciation incentives to the private sector to encourage expenditure on R&D activities.

- 3. *Supporting further inflow of FDI.*** While FDI is necessary for ICT developments, positive spill-over effects will depend on the way FDI is integrated into the economy. Though there have been several good examples of FDI integrated into the local economies, currently a growing division between FDI and local companies can be observed in the New Member States and Candidate Countries. This division - a sort of dual economy - could endanger solid ICT developments. It makes ICT production - and also, to a certain extent, ICT use - dependent on exogenous factors and weakens the positive spill-over effects from the spread of ICT.

In countries which have developed ICT production, two main challenges lie ahead. Where this production was built on cost advantages linked to low wages, the main challenge is not to improve wage competitiveness, but to shift ICT production to higher value-added market niches. The process has already begun and now many of these countries (notably Hungary, Estonia and Poland) will need to provide further direct and indirect incentives to accelerate the shift towards higher value-added activities.

The second policy task is to strengthen domestic ICT producing sectors, which have in certain niches (software production in Poland and Hungary, for example) developed

relatively favourably. The links between foreign and domestic producers should be strengthened, and more domestic producers should be incorporated in international production networks. Thus the fragility of ICT production in these countries would be reduced.

**4. *Increasing the quantity and quality of available human and physical capital.***

Specific policy instruments may improve the growth of the ICT sector. The most important of these is the provision of human and physical capital for two reasons. Firstly, the New Member States and Candidate Countries are small with low levels of efficiency and a lack of domestic capital, and they can only be integrated into global ICT production with the help of foreign investment. Secondly, as the New Member States become less and less wage competitive, they can compete better in middle or high value-added ICT products.

In order to broaden these sectors and increase the average of value-added ICT production, governments need to improve the quality of physical and human capital by expanding R&D expenditure and public investment. Increased public R&D expenditure stimulates private R&D expenditure, while public investment in infrastructure weakens supply-side bottlenecks and improves the productivity of ICT investment. This could improve the attractiveness of ICT sectors for FDI and stimulate better integration of the local SME sector into global production chains.

In order to improve human capital, governments need to increase the level of tertiary education enrolment and reach universal enrolment at secondary level. The New Member States and Candidate Countries are still behind the EU-15 in these two indicators. Secondly, they need to address the broadening functional deficiencies in the education sector, which are resulting in growing gaps between the supply and demand of labour in terms of quantity and quality. These deficiencies can be found in the financing, ownership and institutional structure of the education system, the curricula, lifelong learning, and the continuous retraining of employees.



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