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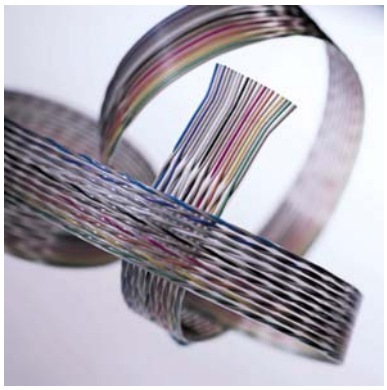

The Impact of ICT on Social Cohesion

Looking Beyond the Digital Divide

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November 2004

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Executive Summary

The New Member States of the EU face challenges in many regards as the economic restructuring in the aftermath of the fall of the Berlin wall continues. One of the core challenges that the New Member States will have to deal with is to counter steer threats to social cohesion. This paper assesses the potential of ICT in this process. Social cohesion here is understood mainly in terms of income distribution, labour market inclusion and educational opportunities. The New Member States show some degree of diversity in this regard. Among the central and eastern European Member States, Poland, Slovakia and all Baltic States appear to have the largest gaps to close in terms social cohesion, but also the Czech Republic, Hungary and Slovenia face various challenges.

In terms of IT use in the population on the other hand, Estonia and Slovenia take the lead, followed by the Czech Republic. The overall ICT adoption rate in Central and Eastern European Countries (CEEC) is linked to economic performance in terms of GDP but the relationship is not very strict and becomes even more blurred when analysing use instead of home access to the internet. Especially in the poorer countries, many users access the internet elsewhere but at home.

Populations affected by the digital divide are especially middle aged and older people, the poor and people with only secondary or less schooling. To the latter two groups, the internet is practically unknown. The unemployed are beginning to use ICT, but do not reach half the adoption rates as the working population. Surprisingly enough, there is a sharp decline in IT involvement already with generations in the late twenties. The internet is a student and youth phenomenon in CEEC, to a much higher degree than in the rest of the EU.

Advanced computer skills are hardly found outside the youngest cohorts and university graduates, even the middle aged workers who will be driving the economy for at least the next one or two decades significantly lack skills needed in a computerised economy. In so far as also a surge in tertiary education among the younger cohorts is visible recently, this may add to the possibility of a significant change in the social structure in the near future in CEEC. Positions held by middle aged cohorts are likely to be replaced by following generations earlier. Younger cohorts are much more skilled at ICT, which will affect productivity and competitiveness at the labour market while the skills of older generations are at risk of being devaluated. This development in itself brings about the risk of a new, generational divide.

Given the fact that work is one if not the major agent in acquiring ICT skills and the low ICT skills diagnosed for the unemployed, the situation resembles a vicious circle for those out of the production process and a virtuous circle for those within. It is shown that unemployment currently is practically hardly a risk at all in CEEC for people who have internet skills. In times of rampant unemployment in some of the countries, the unemployment rate of people with advanced internet skills – i.e. using e-mail, search engines, downloading files and some other, by no means geeky, skills – nowhere exceeds four percent. An amazingly high and significant effect of being an internet user on the risk of unemployment – after controlling for educational attainment, age, gender and health status – is demonstrated.

Finally, four case studies compare respectively Estonia, Poland, Hungary and Slovenia with other European countries each with regard to one country specific social divide and their matching or mismatching in digital divide terms. Except for Estonia, which manages to grant Information Society participation to the unemployed despite of high unemployment and very high poverty rates among the unemployed, social and digital divides appear to match at large.

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1 Rationale

The New Member States of the EU face challenges in many regards as the economic restructuring in the aftermath of the fall of the Berlin wall continues. The Information and Communications Technology Unit of the IPTS[1], who has commissioned this work, has identified three challenges that are of utmost importance for the success of transformation in coming years: to stabilise and foster economic growth rates so as to add new jobs and narrow the gap in standards of living with the old Member States, thereby, second, to maintain and reinforce social cohesion and cushion disparities that almost necessarily will accompany high growth rates, while, third, ensuring high quality education to cope with demographic developments that threaten, inter alia, fiscal options, social security systems and qualified labour supply.

Of the three core challenges that the New Member States will face in years to come, this research is to view at the second challenge and assess the potential of ICT to help policy makers in the New Member States counter steer threats to social cohesion.

Social disparities with regard to levels of income and access to jobs, education and basic infrastructures have been a basic feature of economic development in the European Union ever since the Treaties of Rome. Disparities are present, for example, across different regions, social strata, ethnic groups and genders. Whereas recent years have brought some degree of convergence among EU countries at least at the national level, the latest round of enlargement has brought social divides back on the top of the European agenda. Not only are gaps still existing; they are often even widening as a result of selective economic restructuring, the increasing significance of the capacity (of regions, companies, communities) to innovate, and differences in the ability to add value to the global networked informational economy.

Against this background, discussion around information and communication technologies (ICT) has tended to focus on either the technology's potential to overcome and transcend existing social divides or on the development of yet another, this time digital, social divide. Gainful work (but also social participation and leisure activities) increasingly becomes a form of informational interaction, hinging on accessing, processing, and transferring information. With the availability of broadband connections, work and other forms of interaction hinging on information processing can increasingly be carried out "anytime, anywhere", be it synchronously or asynchronously. ICT's threat, on the other hand, is seen as a logical result from the observation that established social divides as well as newer digital divides seem to follow similar patterns of exclusion, which implies a strong likelihood that both are reinforcing each other.

While there are strong arguments for both of these claims, there is a conspicuous lack of serious attempts to establish evidence about interrelations between old and new divides. This is all the more surprising since EU and Member States policy continues to emphasise ICT's potential to contribute towards social inclusion in areas such as adult education (eLearning), civic participation (eGovernment) and public welfare (eHealth). There are direct and indirect benefits from eGovernment and public e-services. Indirect benefits emerge, as the quality of service improves due to government-to-government use, in case of e.g. process optimisation, back office integration, and other co-ordination and delivery supporting activities While indirect benefits from the use of ICT by public service providers are obvious and not rejected here, the direct benefits of individual use of ICT depend on a supply-demand match. Those on the flip side of the social divide, the in one way or the other disadvantaged are probably those who benefit most from public services but appear to be the least likely to make use of ICT and electronically mediated public service delivery.

From a policy viewpoint it is of special interest to explore whether and how ICT can realistically help bridge social divides, and if so what needs to be done in order to support such developments. Micro

[1] See http://fiste.jrc.es/. The author wishes to express special thanks Marc Bogdanowicz and René van Bavel of the IPTS for their helpful comments to previous versions of this paper.

data from the IST project SIBIS[2] offer country specific information on both ICT uptake and various individual socio-economic inclusion risks and will be analysed to find evidence as to who among the disadvantaged society groups make use of ICT in comparison to less disadvantaged people.

Arguably, in a global perspective ICT adoption is a matter of affluence. Forerunner countries like the US, Canada or the Nordic countries are also leading nations with regard to economic performance. The null hypothesis could hence be and sometimes is drawn that it is all just a matter of economic development, leaving little scope for policy strategies to foster the Information Society. On a macro level, the relationship between GDP and ICT diffusion will be analysed.

On an individual level, the basic assumption of the digital divide is that whether or not using computers, the Internet and other technologies largely follow those dimensions of social structure that shape other individual opportunities and social inclusion or exclusion. In a simple first model, ICT involvement can be expected to be dependent on an individual's supply of economic, social and cultural capital. Given the restrictions of available data, this will be looked into especially in terms of educational attainment and income. Secondly, as ICT are a set of rather new and evolving technologies, cohort effects can be expected to take effect such that cohorts at whose educationally formative ages ICT were not existing or not widespread will have fewer chances of involvement. Thirdly, ICT are to a large extent an office tool and hence especially used by people in gainful employment, especially white collar employment. The socio-economic determinants of ICT diffusion will be looked into, with a special emphasis on the interrelationship between skills, employability and education.

The structure of the report is as following: chapter 2 will approach a definition of social cohesion and then look into the social and economic situation in the New Member States and name the core challenges in this regard. Chapter 3 will give a rather brief overview of ICT adoption at large, and then depict the economic and social factors that determine individual and aggregate ICT uptake, comparing the social factors of ICT uptake with existing social divides. Chapter 4 is dedicated to the question of how ICT can and do bridge social divides. Especially the relationship between employability and ICT skills. is analysed. Chapter 5 includes country specific "case studies" of matching or mismatching social and digital divides. A final chapter summarises the findings and its policy implications.

[2] SIBIS – Statistical Indicators Benchmarking the Information Society. See http://www.sibis-eu.org. SIBIS carried out representative sample surveys in all EU-15 countries, eight of the New Member States (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia), Bulgaria, Romania and in Switzerland and the US. Sample sizes were about 1000 interviews in most countries. For methodological details cf. the website.

2 Social Divides: Challenged cohesion in the New Member States

2.1 Bits and pieces of a definition

Social cohesion is rarely defined explicitly. As a sociological term, cohesion refers to the degree of interconnectedness in social networks. In the public domain and in the political arena social cohesion is connotated and sometimes used synonymously (or antonymously) with terms such as poverty, living standards, quality of life, social and political participation, social inclusion, integration, social divides and social inequality. Definitions often include living standards and sufficient incomes, integration in labour market, educational opportunities, social capital, shared values and the "fabric of society", health, housing conditions and absence of discrimination. Conceptually, a commonly agreed upon distinction between social cohesion and social inclusion does not exist.

Both terms, cohesion and inclusion, seem to involve the concept of participation and the (economic, social, physical etc.) capability and opportunity to do so. They imply a meaning of dichotomy – being included or excluded, being part of cohesive extended network or not – as does the term "divide" which is recently being used rather synonymously with polarisation. Vranken et al. (no date) propose a conceptual typology that does not contain social cohesion but emphasizes the dichotomous character of the inclusion/exclusion termini:

Table 1: A typology in terms of hierarchy and fault lines

	Hierarchy	
Fault lines	no	yes
no	social differentiation	social inequality
yes	social fragmentation	social exclusion

Source: Vranken et al. (no date)

The concept of social inclusion or exclusion in this view is a dividing view upon social inequality. The continuum of social inequality is split into those social elements being in a state of inclusion and those in a state of exclusion. Vranken et al. hence conceptualise social exclusion in terms of polarisation, discrimination, poverty, and inaccessibility.

Social cohesion is a rather similar concept, if not used synonymously to social inclusion. Jenson (2002) identifies four traits of the literature on cohesion. First, social cohesion is seen as a process rather than an end state, secondly "social cohesion involves a definition of who is 'in' and who is not, to whom members of society owe solidarity and to whom they do not". While these two dimensions are identical with the dimensions of the exclusion concept, the third and fourth characteristics are not necessarily. "Third, social cohesion is considered to require and be based on shared values" (ibid.) which adds the relevance of social capital to the notion of cohesion. Fourth, but rather seldom found in the literature, Jenson includes institutions of political democracy and conflict resolution and their legitimacy with the definition of social cohesion.

The EU notion of social cohesion regularly emphasises on the geographical dimension, i.e. the disparities of economic development between regions and countries, as in the context of the Structural Funds. This implies an aggregate approach at the level of regions or countries as opposed to an approach at the level of the individual.

On the other hand, social inclusion tends to be used to frame individual life chances and circumstances in the European policy context. The European Commission in its 2001 report on social inclusion identifies ten risk factors (CEC 2001), which include monetary poverty, unemployment and quality of employment, education, the family situation, disability, health problems and difficult living conditions, housing conditions and neighbourhood disadvantages and immigration, ethnicity, racism and discrimination. The Laeken indicators (cf. Guio 2004, CEC 2003b) endorsed by the European Council to measure social inclusion comprise indicators of the four dimensions financial poverty, employment, health and education, but also add and emphasise the importance of housing conditions. Finally, Eurostat (2002), apart from monetary indicators, uses standard of living indicators such as the enforced lack of household durables, absence of basic housing facilities, problems with accommodation and the environment, lack of ability to afford most basic requirements and the inability to meet payment schedules.

We will in the following look at both, cohesion in its geographical dimension, in terms of comparing country level indicators of societal characteristics with regard to aggregate level convergence or polarisation, and cohesion among or inclusion of members of a society in terms of poverty and life chances.

2.2 Income inequality and poverty

The economic transition from the communist regime brought about an economic shock in many of the New Member States. Poverty emerged as a major issue in most countries during the late nineties, while the Czech Republic and Slovenia stand out as examples of early interventions (CEC 2003a: 176). The overall income level is well below the EU-15 average, with Cyprus and Slovenia experiencing the smallest gap. Poland and the Baltic States have rather low levels of per capita GDP and also of the median income related at-risk-of poverty thresholds.

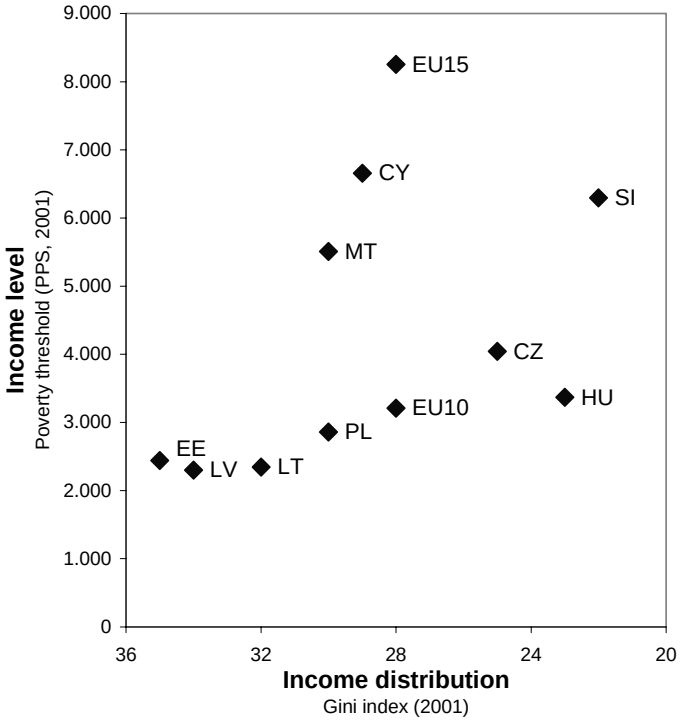
Table 2: Selected indicators of the income situation in the New Member States

		CY	CZ	EE	LV	LT	HU	MT	PL	SI	SK	EU10	EU15
Income and poverty level		(1997)	(2001)	(2002)	(2002)	(2001)	(2001)	(2000)	(2001)	(2000)		(2001)	(2001)
At-risk-of-poverty threshold	PPS	6658	4045	2440	2301	2346	3369	5510	2859	6295	:	3210	8253
(single person)	EUR	5312	1897	1327	1215	1124	1641	5038	1742	4180		1818	8319
At-risk-of-poverty threshold	PPS	13983	8494	5124	4833	4926	7075	11572	6004	13219	:	6741	17332
(2 adults, 2 children)	EUR	11155	3984	2787	2552	2360	3446	10581	3658	8778		3818	17469
Per capita GDP (PPS, EU-15 =100)													
(all data 2001)		86.2	58.8	38.5	30.0	33.3	51.1	56.3	39.4	69.4	47.9		100
Poverty risks													
At-risk-of-poverty rate (after social transfers)		16	8	18	16	17	10	15	15	11	:	13	15
0-15 years		12	12	18	19	20	14	21	21	9	:	18	19
65+ years		58	6	16	10	12	9	20	6	21	:	8	19
Women		18	8	19	16	17	10	15	15	12	:	13	16
Dependent Employees		5	3	9	9	9	5	6	7	4	:	6	6
Self-employed		9	5	13	22	33	3	1	19	10	:	15	16
Unemployed		23	31	48	42	41	31	50	37	43	:	36	38
Income distribution													
Income quintile ratio (S80/S20)		4.4	3.4	6.1	5.5	4.9	3.4	4.5	4.5	3.2	:	4.2	4.4
Relative median poverty risk gap		24	16	24	20	22	16	18	22	18	:	20	22
Gini coefficient		29	25	35	34	32	23	30	30	22	:	28	28

Source: CEC (2004)

The at-risk of poverty rate ranges from 8 percent in the Czech Republic to 18 percent in Estonia. Social groups that need particular attention with regard to poverty risks are older people in Cyprus, the unemployed in Malta and the Baltic States, further the less well educated in probably many countries, although no specific risk of poverty data are available. The income distribution is most even in Slovenia and the Czech Republic. The Baltic States and Poland experience the most severe income inequalities.

Figure 1: Income distribution and income level in the New Member States[3]



Data: CEC (2004)

2.3 Employment, unemployment and poverty

Employment and unemployment rates[4] differ considerably across the New Member States. The overall employment rate of EU-10 is 55.9 percent compared to 64.3 in the old EU-15 and unemployment is very high at 14.3 percent (EU-15: 8 percent).

[3] This and the two following illustrations are drawn up such that a movement from down left up right constitutes what is commonly associated with an improvement as to social cohesion.

[4] The employment rate—also called the employment-to-population ratio—is the percentage of working-age people (aged 15 years and up) who have (full-time or part-time) jobs. The commonly used definition is usually that of the Labour Force Survey.

The unemployment rate is the share (percentage) of people in the labor force who are unemployed. The labor force includes all workers and the unemployed. However, in order to be considered unemployed, a person has to meet several requirements as in particular that they were currently available and looking for work.

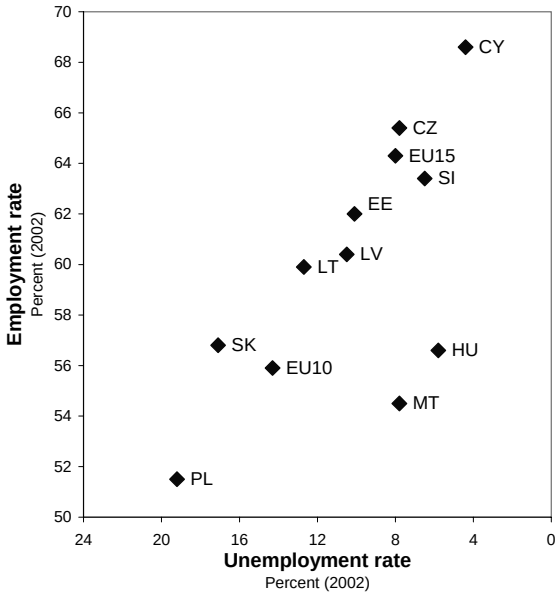
Table 3: Selected indicators of the employment situation in the New Member States

All data refer to 2002	CY	CZ	EE	LV	LT	HU	MT	PL	SI	SK	EU10	EU15
Employment rate	68.6	65.4	62	60.4	59.9	56.6	54.5	51.5	63.4	56.8	55.9	64.3
Employment rate male	78.9	73.9	66.5	64.3	62.7	63.5	75.3	56.9	68.2	62.4	61.8	72.8
Employment rate female	59.1	57	57.9	56.8	57.2	50	33.6	46.2	58.6	51.4	50.2	55.6
Employment rate 55-64	49.4	40.8	51.6	41.7	41.6	26.6	30.3	26.1	24.5	22.8	30.4	38.8
Unemployment rate	4.4	7.8	10.1	10.5	12.7	5.8	7.8	19.2	6.5	17.1	14.3	8
Unemployment rate males	4	6.1	10.2	10.3	12.1	6	6.5	18.6	6.1	16.8	13.6	7.2
Unemployment rate females	5.1	9.9	10	10.7	13.3	5.5	10.5	20	7.1	17.4		8.9
Youth unemployment	9.7	16.9	17.7	24.6	21.4	11.9	:	41.7	15.3	37.3	31.9	15.1
Youth unemployment males	9.3	16.6	14.2	22.1	20.5	12.6	:	40.9	13.9	38.3	31.4	14.8
Youth unemployment females	10.1	17.2	22.9	27.8	22.6	11.0	:	47.7	17.2	36.1	32.7	15.5
Long term unemployment	0.8	3.7	4.8	5.8	7.0	2.4	3.2	10.9	3.3	12.1	8.1	3.0
Long term unemployment males	0.5	2.9	5.7	6.5	7.2	2.7	3.4	9.7	3.3	11.7	7.4	2.6
Long term unemployment females	1.2	4.5	3.8	5.0	6.9	2.1	2.4	12.3	3.4	12.5	8.9	3.6

Source: CEC (2004)

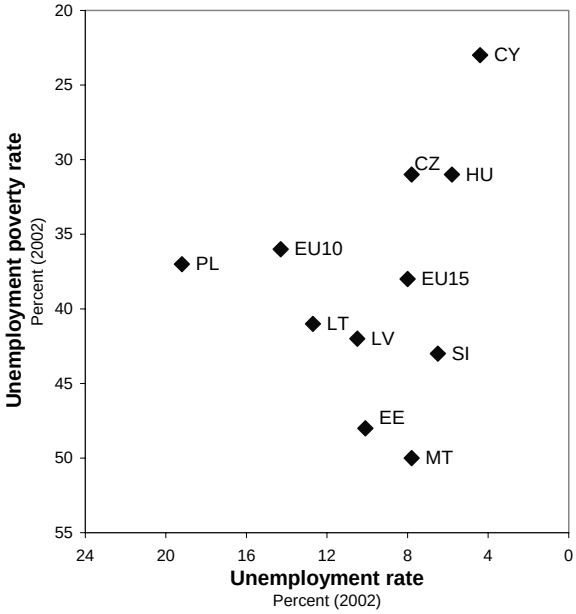
Cyprus, the Czech Republic and Slovenia overall show a satisfying situation with low or moderate levels of unemployment and employment rates well at or above EU-15 level. While Malta and Hungary both also have comparably moderate levels of unemployment, both countries show a rather low labour force participation. The Baltic States and even more so Poland and Slovakia face severe labour market problems with particularly high levels of unemployment. As regards labour market integration of older workers, especially Estonia and Cyprus have high participation rates. Slovakia, Slovenia, Poland, Hungary and Malta need to improve employment chances of older workers considerably if they are to keep up with demographic developments. Youth unemployment is a great concern in all New Member States, across the ten countries it is twice as high as in the old EU. Poland and Slovakia are severely challenged to integrate younger ones into the labour market.

Figure 2.a: Employment and unemployment rates in the New Member States



Employment appears also to be one if not the main determinant of (absence of) poverty and social exclusion: high shares among the unemployed meet the poverty criteria[5]. There are again important differences between New Member States: Estonia and Malta show the highest shares of poverty among the unemployed, while Poland, with its high proportion of unemployed also shows below average performance on such indicator. On the other hand, the Czech Republic, Hungary, and in particular Cyprus show encouraging profiles - low unemployment rates / low unemployment poverty rates -, better than those of EU10 and EU15 averages.

Figure 2.b Unemployment rates and unemployment poverty risks in the New Member States



Data: CEC (2004)

2.4 Other challenges

Education imparts human and cultural capital and is the key to employability and social participation. While no data is available on the poverty risks of poorly educated and/or skilled persons, these factors are usually empirically linked with worse chances for gainful employment and increased exclusion risks. Although adult literacy is high in all countries (above 97%, except Malta 92%), disparities regarding educational attainment of the labour force population prevail as well as disparities in the prospective educational levels of generations currently in school or higher education. In all countries there are considerable shares of the population who have no secondary education level achievements. These range from 12.4% in Cyprus to 34.2% in Hungary and 45% in Bulgaria (CEC 2003a: 212).

Little data is available on the association between household poverty and children's educational performance (CEC 2003a: 213). It may however be assumed that such relations exist, and that children from households that are affected by poverty and unemployment deserve special attention.

Many other particular challenges exist and are well documented in the Joint Inclusion Memoranda (JIM 2003). Rural-urban disparities need to be tackled in many of the New Member States. The

[5] Unemployment poverty here represents the at-risk-of-poverty rate for unemployed persons, i.e. the percentage of unememployed persons who live in households with an equivalised disposable income (after transfers) below 60% of the median equivalised income of the country they live in (cf., also for limitations of this concepts, Guio 2004: 6ff.).

integration of Roma minorities is a task to be accomplished in some and of non-national and ethnic minorities in other countries. Some countries have an especially high need for improvement in housing conditions and affordable housing. Social capital is in issue that has been emphasised above. Integration of people with special needs, the disabled and people with health problems in the labour market and into society at large are mentioned as problems in the Joint Inclusion Memoranda.

2.5 Conclusion

The core challenges with regard to social cohesion for the New Member States can be summarised in two terms: income gaps and unemployment rates Generally, economic growth is pursued in order to equalise standards of living with those countries of the former EU-15. But Estonia, Latvia, Lithuania, Poland and Slovakia have large gaps to close. These countries also have the most uneven income distribution and highest poverty rates.

At the same time, employment is desperately needed to fight poverty risks. Virtually all countries are challenged, with only Cyprus, the Czech Republic and Slovenia being in a somewhat better position. Unemployment is rampant in Poland and Slovakia and unemployed persons face a very high poverty risk especially in Malta and Estonia, a problem shared with many of the former EU-15 states.

3 Digital divides: ICT adoption in the New Member States

The rationale for researching the digital divide is based on the assumption that the lack of access and potential for voluntary participation can confer disadvantages, or compound them where these are already present. Digital inclusion is a concept about the disparities in terms of citizens' participation in the Information Society. This participation may be conceptualised in the first instance as ICT access, levels of use and use patterns, with the main focus on the Internet, being the most ubiquitous and relevant IS communication tool. Additional issues, such as the rationale for, and sustainability of this participation, as well as some relevant issues around access barriers may also be considered constituting digital inclusion. Recently, emphasis in digital divide research has to some degree turned from mere access figures to disparities in skills at using ICT and in benefits deriving from ICT (e.g. de Haan 2003). Some evidence has been found, that while access and use (simplistically understood as binary yes-no categories) equalises within and between some countries, major gaps in skills and benefits remain (de Haan 2003, Hüsing/Selhofer 2004).

Internet and computer uptake in the New Member States[6] have not proceeded as far as in the old EU-15. About 29% of the adult (15+) population use computers, 21% use the Internet, but only 11% have Internet access at home. Internet adoption remains below the old EU-15 level in all countries but Estonia. Especially Hungary, Poland, Bulgaria and Romania have rather low use and access rates.

The disparity between new and old Member States is even larger when looking at home access rather than at usage at all. This is because fewer users in the New Member States rely on home access but access elsewhere, especially at public Internet access points (PIAPs). PIAPs turn out to be of special importance in particular in the poorer countries: Estonia, Latvia, Lithuania, Slovakia, Bulgaria and Romania. However, much of the disadvantaged parts of society can not be reached by PIAPs (see box: *Who benefits from public Internet access points?*) Estonia nevertheless has the second highest home access rate (27%), following Slovenia (34%). As home access is relatively scarce, so is broadband home access. Only in Estonia (7%) broadband access has started to become more than an niche market for private households.

Table 4: Internet access and use in CEEC

Country wise percentages,

	CZ	EE	HU	LV	LT	PL	SK	SI	BG	RO	CEEC	EU-15
Internet use	33	52	18	28	30	20	24	37	21	13	21.3	46.4
Experienced users (2 years or more)	16	35	12	20	15	14	11	31	12	9	13.4	29.8
Internet access at home	19	27	11	7	10	13	9	34	9	4	11.4	44.1
Use of PIAPs	6	12	2	9	9	6	9	6	10	8	6.6	5.6
Broadband access	<1	7	1	<1	1	<1	<1	2	1	<1	0.4	7.5

Source: SIBIS survey data, 2003. the author's calculations.

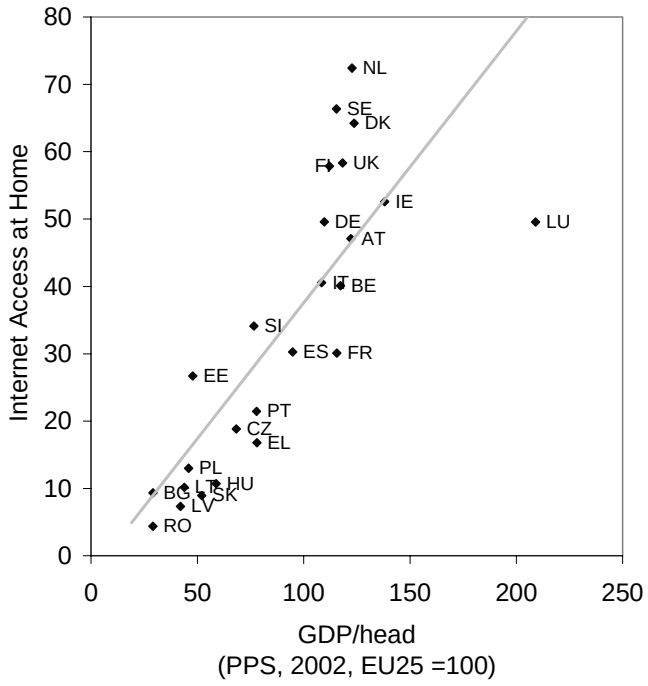
6 The following data refer to the SIBIS surveys which were carried out in 8 New Member States (all except Cyprus and Malta) and in Bulgaria and Romania. Data referred to as total of the Central and Eastern European Countries (CEEC) cover these countries.

3.1 ICT adoption and GDP

Both national Internet access and use rates at national level can be expected to be linked to the economic performance of an economy. The more developed a country is in economic terms, so the argument, the more people can afford and need to rely in their daily business on ICT: wealthier economies would have experienced a shift from industrial goods production to a service economy relying on the creation and processing of information, and on knowledge workers who are using ICT.

However, empirically this relation is not that strict as the following illustration shows. Access and use rates are contrasted with GDP/head at purchasing power standards. A linear regression line[7] is included so as to assess the "performance" on Internet indicators against a GDP induced trend.

Figure 3.a: Internet access rates by GDP/head across EU25



Data: CEC (2004) and SIBIS survey data 2003.

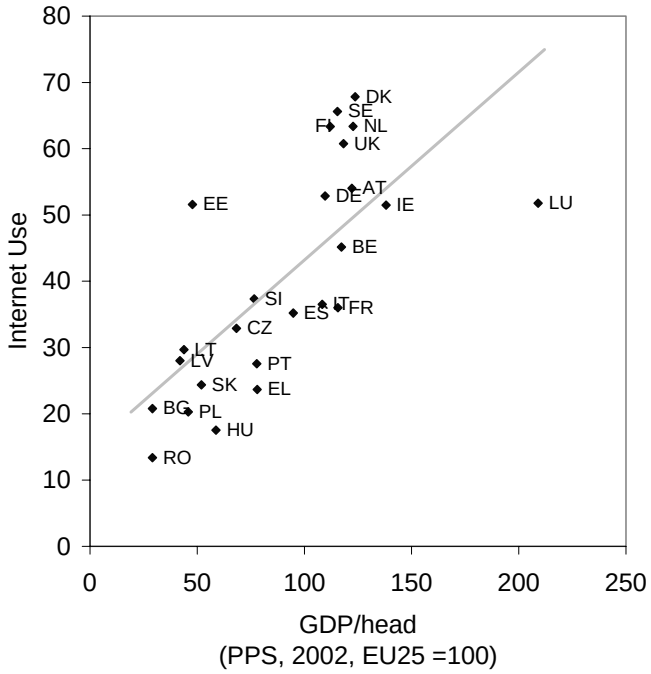
There are eleven western European countries with a comparable GDP/head level around the EU-15 average whose Internet access rates vary between 30% in France and 74% in the Netherlands. In the New Member States, Estonia has a much higher penetration rate than Latvia, Lithuania, Poland and Slovakia, which also all have a comparable GDP/head level. This clearly illustrates, that aggregate or macro effects are not that clearly pronounced.

As we will see later, however, there is an income-use connection at the individual level. The fact that there is no simple correlation between the two at the macro level reminds us of the fact that GDP/capita does not necessarily convey individual propensities of technology involvement such as opportunities in employment and skills. There is a nationally determined residual which may hinge on a whole bundle of reasons. Among others redistributive access for all policies may have an effect, favouring the poor, the old, the women, the minorities, etc. The spread of English language skills seem to correlate with access and use, as does the labour force participation rate. Smaller countries – i.e. more "open" or interlocking ones in economic and cultural terms– seem to be more advanced than

[7] Unweighted, i.e. all countries have the same weight. The regression line is only a rather inexact visualisation of the effect. As access and use rates have a natural range of values between 0 and 100 an S-curve would probably be more appropriate.

larger ones. Cultural or mentality related affinities have also quite often come up in the discussion of differences in this regard, although more often than not tautologically as a last resort to "explaining" unexplained residuals.

Figure 3.b: Internet use rates by GDP/head across EU25



Data: CEC (2004) and SIBIS survey data 2003.

Other than Internet home access, which is obviously linked with expenses for equipment and access costs, Internet use (wherever) may not as much depend on the household's revenues. This is supported by the empirical picture above. Internet use is much more widespread than Internet home access in almost all New Member States. Interestingly enough, there appears to be a use-access difference that is virtually not existent in the old Member States. This way, Estonia reaches a usage level equal to the ones in Germany, Austria, Ireland or Luxemburg. In Latvia usage level is four times the access level, in Lithuania, Romania and Slovakia the relation is about three to one.

It can hence be observed, that not only there is no strict match between GDP/head and ICT uptake, but also that there are different strategies in the western and eastern EU Member States regarding the mode of Internet access which allow a higher than predicted uptake in some of the poorer countries. This supports the view that there actually is scope for focused Information Society policies to have an impact. There is room for different strategies – strategies for access – per country that could make a difference.

3.2 ICT adoption and individual profiles

While the former paragraph focussed on a country level perspective, we now turn towards micro level association of ICT take-up and socio-economic circumstances. The implicit assumption is that ICT take up is much more affected by individual patterns of education, labour status, income and socio-economic status than by institutional or economic national settings. Socio-economic groups such as students, older people or the unemployed are analysed across national borders.

The first and most obvious finding is that the Internet is for the time being very much a younger generation and student phenomenon in the New Member States. The factor of being a student is as yet the most decisive statistical predictor in explaining Internet use. Severe disadvantages with regard to ICT use can be observed for people without tertiary education, the unemployed and inactive, for low

incomes, people with disabilities and older people. Being most behind, only less than 2 percent of those with basic secondary or less schooling and less than 2 percent of those aged 65 and over use the Internet.

Table 5: ICT adoption and use in CEEC (per category of population)

Percentages of the respective groups.

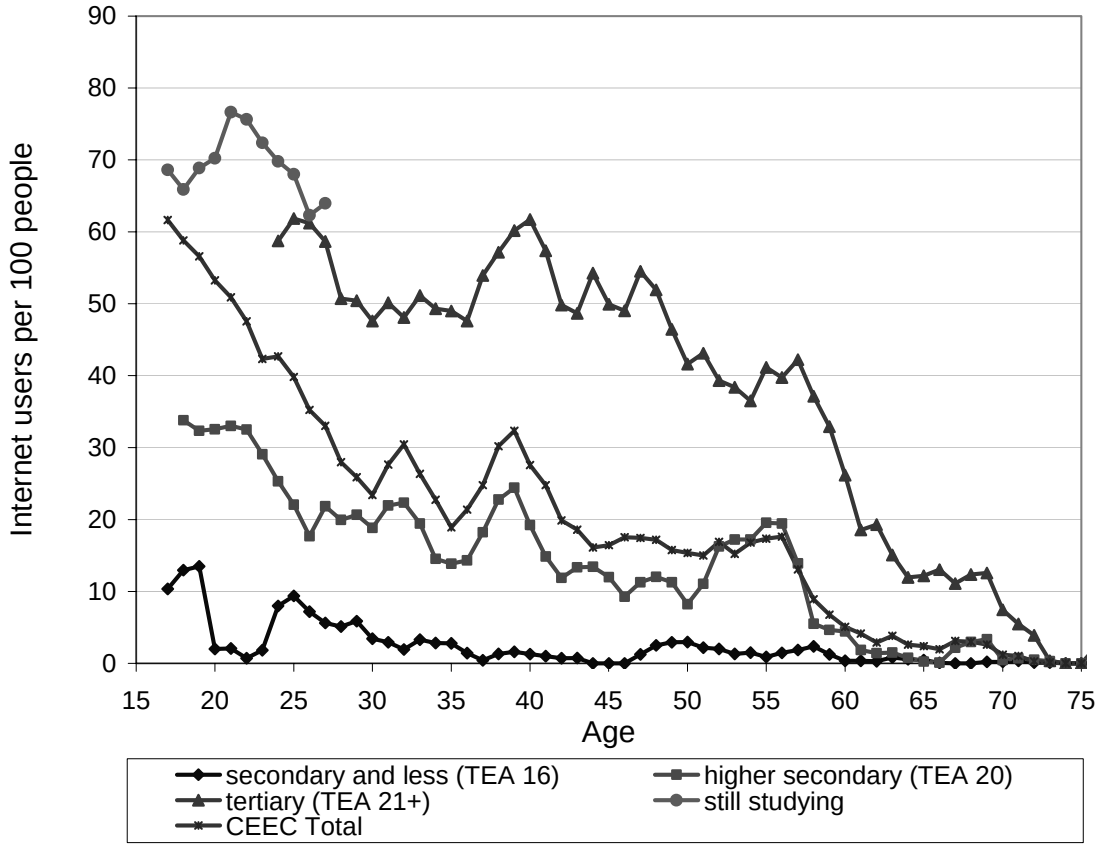
	Internet use	Computer use	Internet at home	Use of PIAPs	E-commerce use	Own mobile phone
Total CEEC	21.3	28.7	11.4	6.6	2.1	43.7
Per Labour market participation						
working	31	44	18	5	4	64
unemployed	11	16	7	5	<1	39
other not working	16	20	7	8	1	27
Per Income						
Three upper income quartiles	25	33	13	8	2	49
Low income quartile	6	10	3	2	1	23
Per Educational attainment						
secondary and less (TEA 16)	1	3	1	<1	<1	15
higher secondary (TEA 20)	15	23	9	3	1	48
tertiary (TEA 21+)	42	54	25	7	6	63
still studying	69	77	24	35	4	65
Per Age groups						
up to 24	52	59	18	26	2	62
25 to 49	23	34	14	5	3	55
50 to 64	11	17	9	1	2	32
65 and more	1	2	1	<1	<1	12
Per Illness/disability status						
No illness /disability	26	34	13	8	2	51
Long-standing illness or disability	7	12	5	2	1	22

Source: SIBIS survey data, 2003, the author's calculations. Weighted CEEC totals.

With regard to age, already the middle age cohorts fall behind the younger cohort. Internet access at home in general also follows these trends, with the exception that the dominance of young people and students is not as significant, rather people with tertiary education tend to have highest home access rates.

The age effect between young and middle cohorts is not a statistical artefact of grouping ages together as the following illustration depicts. Already people aged about 28-30 are well behind the youngest cohorts as regards Internet usage. But the sharp decline of Internet use rates already at an age around 30 is to large part caused by educational expansion. It appears that for cohorts aged 30 and older, higher secondary education was the norm.

Figure 4: Internet use in CEEC by age and educational attainment



Source: SIBIS survey data, 2003, the author's calculations. Floating 3-year averages. Weighted CEEC totals.

The overall Internet uptake rate curve of the total population is largely equal to the uptake rate in groups with educational attainment at higher secondary level. For the younger cohorts the total uptake curve, however, bends towards the students and tertiary education categories. This reflects the increasing importance of tertiary education and the impact of higher educational participation in younger cohorts.

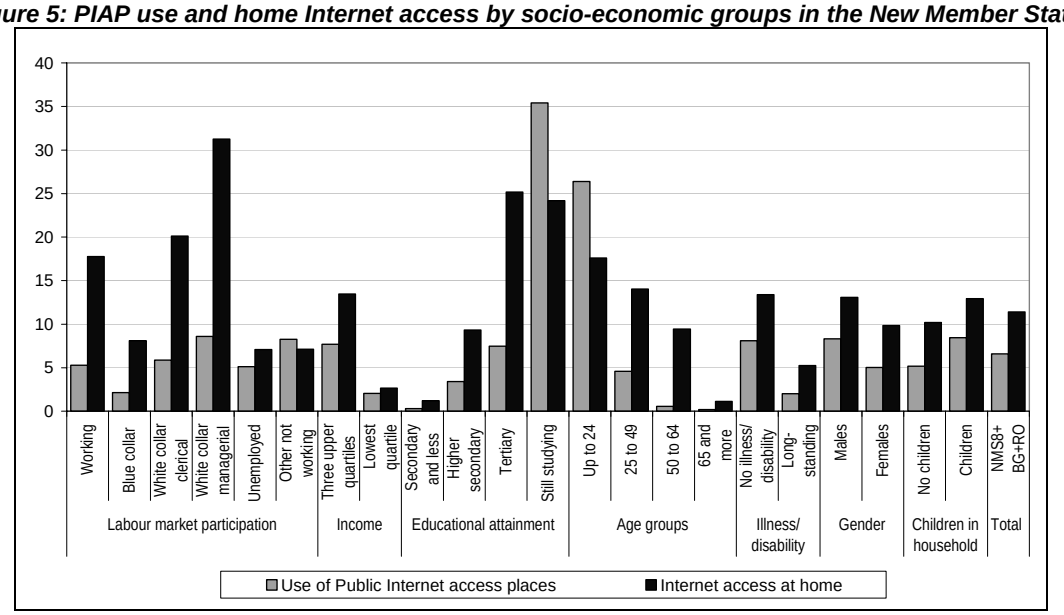
Box 1: Who benefits from public Internet access points in CEEC?

As has been noted before the gap between home access and Internet use is much larger in the New Member States than in the old EU-15, one reason being that many people who use the Internet cannot afford home access. Who are the PIAP users?

PIAP users are the younger age groups and students predominantly. In these groups more PIAP users than people with home access are to be found. The unemployed and people with less education seldom use public access points. The core challenge, thus, remains the same. As disadvantaged groups hardly have the skills to use the Internet, these also do not know how to use the Internet in public places.

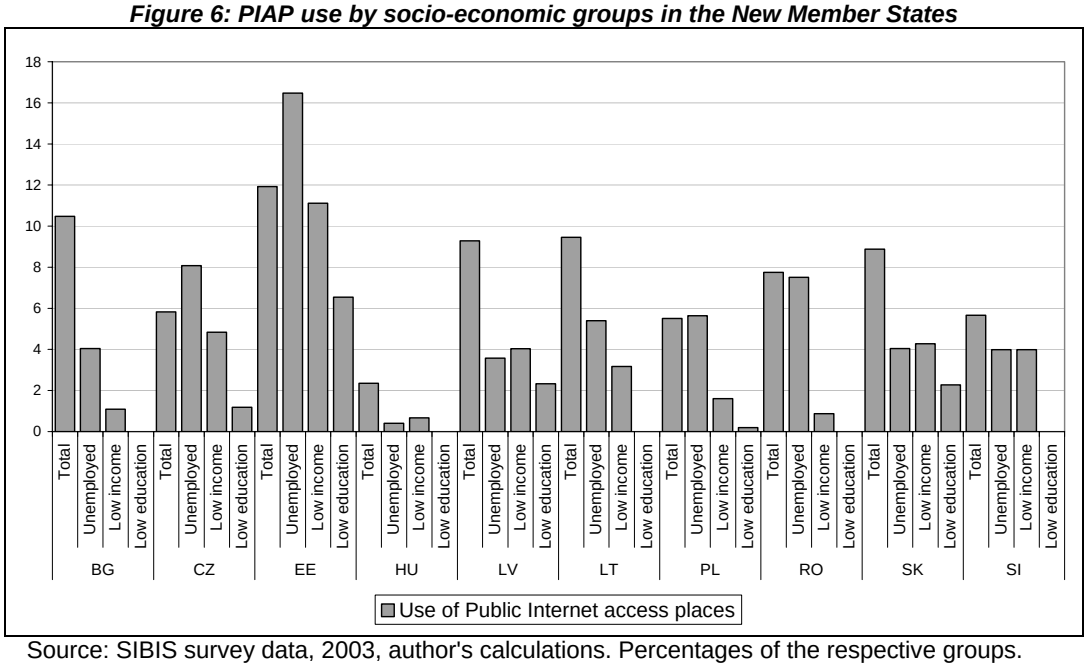
This argument is to some extent qualified, when looking at national peculiarities, however. Between countries and national social groups there are huge differences as to using the Internet in public places. While PIAPs seem to play no role especially in Hungary, in many of the countries PIAPs have a significant role in ensuring access to the Internet by disadvantaged population groups. In Estonia with its high usage level, the percentage of Internet users is twice as high as the percentage of people having home access. In Lithuania and Latvia, with a somewhat lower percentage, the relation is even three times as many users as people with home access. In Slovenia, on the other hand, access and use rather balance each other out. In Estonia, usage peaks at 16% of the unemployed who use public access. But also in the Czech Republic, Romania, Lithuania and Poland a small but significant part of the unemployed use PIAPs.

Figure 5: PIAP use and home Internet access by socio-economic groups in the New Member States



Source: SIBIS survey data, 2003, author's calculations. Percentages of respective groups. Weighted CEEC totals.

Figure 6: PIAP use by socio-economic groups in the New Member States



Source: SIBIS survey data, 2003, author's calculations. Percentages of the respective groups.

3.3 ICT skills and individual profiles

Access and use at large are not per se beneficial. To gain economic advantages from ICT, a minimum skill level is required. Simply knowing how to use an Internet browser will not suffice. But who are those knowledgeable about the Internet? SIBIS has developed a composite indicator that combines four types of skills at using the Internet into an overall "digital literacy" score[8].

A survey of the Internet skills distribution observed across social groups uncovers an even sharper picture of the digital divide than the mere access and use (i.e. use at all, with whatever intensity and skills) data have done before. The major Internet skills base of most economies observed here is still at school or in the university. Apart from the students, the remaining population that is skilled at using the Internet tends to have a university degree and be in paid work. Internet skills of the less well educated labour force are almost negligible, and hardly existent among unemployed.

Especially looking at the middle age group of 25-49 year olds reveals a sobering picture. ICT skills among these cohorts are inadequate. Amazingly low skill levels are found among the unemployed and inactive people of this age but also only one third of people in paid work have any basic Internet knowledge at all, and 13 percent only show advanced skills.

Table 6: Internet skills by activity status, educational attainment and age[9]

Percentage of people with basic/advanced skills per group.

	Working		Unemployed		Other not working	
	Basic skills	**Advanced skills**	**Basic skills**	**Advanced skills**	**Basic skills**	**Advanced skills**
Educational attainment						
secondary and less (TEA 16)	5	1	1	1	<1	<1
higher secondary (TEA 20)	17	8	9	3	5	1
tertiary (TEA 21+)	31	30	34	12	11	2
still studying	30	44	-	-	49	29
Age groups						
up to 24	30	23	25	10	44	26
25 to 49	20	13	8	3	10	3
50 to 64	17	10	6	1	3	<1
65 and more	:*	:*	:*	:*	1	<1

Source: SIBIS survey data, 2003, the author's calculations. Weighted CEEC totals.

The middle age groups are hence of major concern, both in terms of access and in terms of skilfully using ICT. The 25-49 years age cohorts will be supplying a major part of the labour force in CEEC economies for decades to come. They will be likely to face strong competition from younger age groups unless their IT user skills will be fostered rapidly. It is assumed that retrieving and processing information through ICT will become more and more important, i.e. that more and more jobs include

[8] The skills included are: communicating with others (by e-mail and other online methods), obtaining (or downloading) and installing software on a computer, questioning the source of information on the Internet, and searching for the required information using search engines. Advanced skills in this definition mean that the respondent needs to score more than 50% of the scale maximum, which means that they must feel very confident at least in two of these activities and fairly confident at least in one. Basic skills mean that the respondent is fairly confident at least in one item. Non-users are assigned zero skills.

[9] This indicator is a composite score of various items of self reported capabilities concerning the use of the Internet. Percentages of the respective groups are not cumulative i.e. people with advanced skills are not included in basic skills. If one is interested in the percentage of people with *at least* basic skills, both figures need to be added up. An asterisk (*) signifies an insufficient number of cases for relevant statistical processing.

these as core routine or auxiliary tasks. The CEEC economies cannot be expected to rely solely on their youngest cohorts to supply such capabilities neither to afford an unskilled labour force in such domains in the coming years.

Box 2: Are Mobile phone adoption rates such a different case?

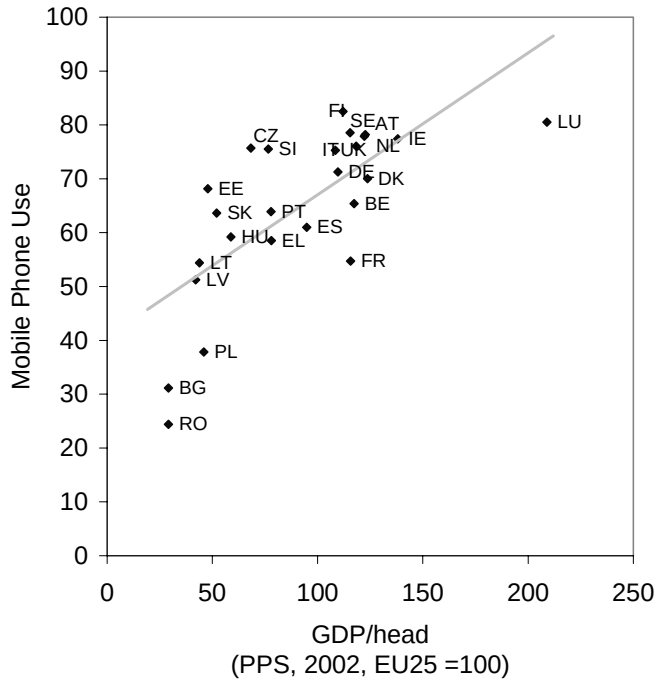
Mobile telephony has reached much larger parts of the population than computers and the Internet. 44% of people in the countries observed have a mobile phone, with the Czech Republic and Slovenia (each 76% in 2003) leading above EU-15 level (69% in 2002). Mobile phones have not yet reached large market shares in Poland, Romania and Bulgaria.

Table 7: Mobile phone use in CEEC

	CZ	EE	HU	LV	LT	PL	SK	SI	BG	RO	CEEC	EU-15
Mobile phone	76	68	59	51	54	38	64	76	31	24	43.7	69.1
SMS usage	67	54	43	45	45	30	56	50	23	13	33.8	40.3

Source: SIBIS survey data, 2003. Country wise percentages, the author's calculations.

Figure 7: Mobile phone access use rates by GDP/head



Also for mobile phones the relation between GDP/head and penetration is not very strict. The gap between Poland and Estonia, which have a similar GDP/head level, is huge. Both Slovenia and the Czech Republic have a much higher mobile phone rate than Portugal and Greece and even of countries with a higher GDP/head as Germany, France, Spain and even Denmark.

Mobile phone access is also somewhat more evenly distributed across the population in terms of higher access rates of disadvantaged groups. Socio-economic and demographic variables (especially educational attainment and being active) are strongly related to mobile phone use, although not as strongly as for Internet use. Especially the unemployed, low income households and the formally less educated population have a higher probability to own a mobile telephone rather than be Internet users. Still, while altogether 44% own a mobile phone, lowest penetration is found with 12% of those aged 65 and over, and 15% for those with basic secondary and less schooling. The unemployed are not as much behind with mobile phones as with Internet use and access. Also, students are not as much ahead of the rest of society, their mobile phone adoption equals that of people in employment.

The much higher uptake of mobile telephony poses the question, whether mobile phones are prone to offer social benefits as much as the internet does. Surely some mobile applications may to some extent support eLearning, eGovernment and eHealth and other services over the mobile phone. Using mobile phones will not bring about the by product of learning how to use computers and the internet, however. If one shares the view that a large share of the concerns about the digital divide are not about easing some sort of social service delivery but enabling people to attain the skills needed in the computerised economy, than the beneficial effect of mobile phone use and m-services still need to be proved

3.4 Conclusion

As regards general ICT adoption indicators in the population, all New Member States considerably lag behind the EU-15, except Estonia and, following at some distance, the Czech Republic and Slovenia. The digital divide between these countries does not clearly match with their economic performance.

The unemployed and the less educated are sharply behind the population average concerning Internet and the use of computers. There is significant difference between the indicators “using the Internet” and “home access to the Internet” which does not correspond to patterns observed in the old EU-15. PIAPs seem to play a significant inclusive role in Estonia and in some other countries with overall lower Internet use such as Latvia and Lithuania.

An age gap is observed: Internet usage rates show a sharp decline for age cohorts from around 30 years and beyond. Decomposing this decline by educational indicators reveals again the association of high educational attainment with Internet uptake. The significantly higher use rates of the youngest cohort can be seen as mainly an effect of an observable higher educational participation. This in turn makes the actual threat of digital exclusion for middle and older cohorts even more obvious. The middle age groups are of major concern, both in terms of access and in terms of ICT skills.

4 Social divides: Can ICT help?

ICT may well and will create inequalities. And ICT are usually not invented primarily to bridge social divides. Technology usually is to the benefit of the technology savvy, to the skilled users and is thus prone to increase social gaps. As the advanced users move ahead, non-users will most probably not keep pace in terms of life opportunities and jobs. Not having access, nor the skills, and neither the motivation to use ICT will entail serious disadvantages, the more so as IT savvyness becomes a matter of course in the younger generations. Getting involved with ICT hence is not just a new means of helping the socially disadvantaged bear a fretful situation but an end to overcome insufficient economic chances in itself. ICT will not reverse societal structure and at once bring about jobs for the unemployed and all the skills needed to the less well educated. But digital exclusion has begun and will almost necessarily bring about less social and economic chances for those excluded.

Still, two mechanism of beneficial impact from ICT can be distinguished. On the one hand, ICT can be used to support people and deliver services and subsidies, and on the other hand ICT have the potential to empower people's participation in the economic, social, political and cultural realm. The first mechanism refers to benefits deriving from the ability to draw on ICT mediated interaction with government and public services, while the second mechanism is about benefits deriving from the ability to use ICT, whether in a productive process, i.e. at work, or in participation in social, political and cultural life[10].

Sustainable support will probably be most promisingly supplied if it is managed to cater for acquiring the skills needed and increasingly required by the labour market. Just as with globalisation, there appear hardly to be opting out options from the information economy and its rules of competitiveness, not for economies as a whole and hardly for the individual either. The consequent policy implication then is not only to deliver public services electronically but also to empower people to have the capabilities to participate in the economy. To put it short, (skilled) labour force participation is the key factor to escape the poverty risk for many, with skills requirements including a rising share of ICT skills in years to come.

Trying to answer the core question, "how can ICT bridge social divides?", involves to fan out the whole agenda of socio-economic ICT research, be it ICT economics, research in eGovernment, eWork, ICT in education and life-long learning, eInclusion or eHealth. Paradigmatically, the following propositions may be hypothesised:

a) ICT skills significantly enhance employability. Unemployment is to a large degree low skill unemployment.

b) ICT can significantly contribute to skills acquirement (both ICT and non-ICT skills).

c) ICT can significantly enhance access to and outcome of education and training.

d) ICT can be used to give access to otherwise barred labour markets.

e) ICT can be used to enhance labour market information and thus reduce frictional unemployment.

f) ICT can be used to improve the ability to draw on public services.

g) ICT has the potential to improve access to the health system and thus improve prevention and health care delivery.

h) ICT can be used to sustain social networks and build communities and increase political participation.

[10] Indirect benefits stemming from improved quality of public service which are due to system internal process optimisation, back office integration, and other co-ordination and delivery supporting activities, are a third mechanism that will however not be taken into account in this context.

While it is not the aim of this work to elaborate on all these propositions, we have tried to illustrate below the relation between employability and ICT. Further some anecdotal evidence about the ability to draw on public services, on labour market information, e-health and social networking, is presented (see box *To what end are ICT being used*).

4.1 Internet use and employability: some empirical evidence from CEEC

In the CEEC, people at work have a much higher propensity to be ICT users than unemployed or inactive people. This observation is confirmed across educational and age groups and genders as the following table indicates.

Table 8: ICT use in CEEC by labour force status across educational, age and gender groups

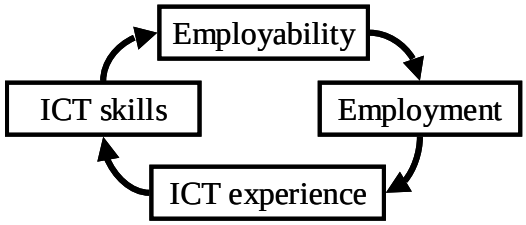
Percentage of users per group.

	Working			Unemployed			Other not working		
	Mobile phone	Internet use	Computer use	Mobile phone	Internet use	Computer use	Mobile phone	Internet use	Computer use
Educational attainment									
secondary and less (TEA 16)	31	4	9	24	3	5	10	<1	1
higher secondary (TEA 20)	63	22	35	39	10	15	29	5	8
tertiary (TEA 21+)	78	57	73	65	33	41	27	12	16
still studying	88	68	76	N/A	N/A	N/A	62	69	77
Age groups									
up to 24	78	43	52	58	26	31	57	62	69
25 to 49	65	30	43	38	8	14	32	12	16
50 to 64	51	26	38	17	5	7	24	4	7
Gender									
Males	65	30	40	35	13	17	29	20	24
Females	62	31	47	43	9	15	26	13	17

Source: SIBIS survey data, 2003, the author's calculations. Weighted CEEC totals.

It is widely accepted that ICT skills enhance employability significantly. On the other hand, many learn most of their ICT skills through learning-by-doing at their workplace. Vice versa, unemployment hence disentitles those concerned of a major source of skills acquisition which would in turn be one factor to increasing their employability. Employability and Internet use seem to be in a circular relationship, but the arbitrariness of viewpoint already hints at a dilemma of causality here.

Figure 8: ICT experience and employability. A virtuous / vicious circle

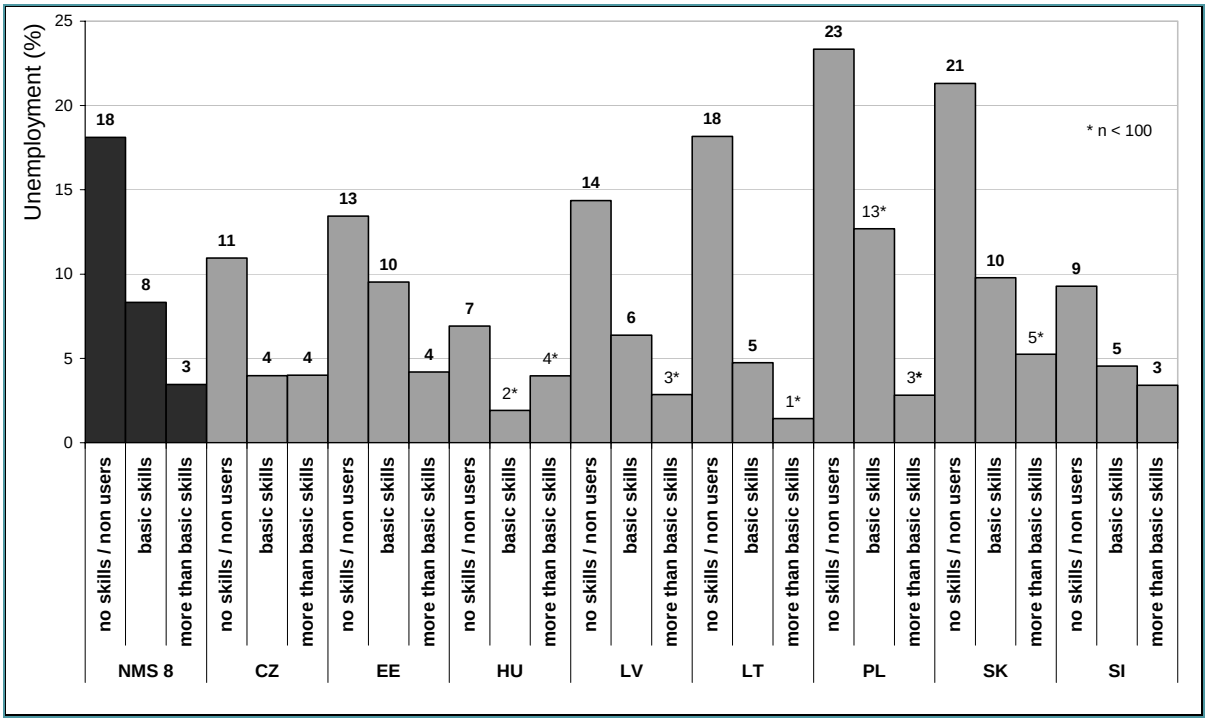


We have computed from survey data the unemployment rates of people with and without Internet skills. In none of the countries observed the unemployment rate for people with more than basic (i.e., advanced in the sense explained above) skills exceeds 4 percent. While altogether the unemployment rate for people without Internet skills is 18%, this drops to 8% for people having basic and 3% for people with advanced Internet skills. In the most advanced Information Society among these countries, Estonia, however, basic skills do not seem to "suffice" anymore, they have become more

common than in other countries and hence have lost some of their competitive advantage in the labour market[11].

To test whether Internet skills can contribute to employability a logistic regression model (see annex) is analysed. Unemployment risks are statistically predicted by the factors age, educational attainment, gender and health status.

Figure 8: Unemployment rates by Internet skills in CEEC



Source: SIBIS survey data 2003, the author's calculations.

Respondents aged 15-64. Reweighed sample to fit official statistics unemployment totals.

Results show that the unemployment risk is significantly affected by all these factors. Other things the same, the odds ratio of women to be unemployed is increased by 34% when compared to men. People with tertiary education have a considerably decreased risk of being unemployed: the risk is decreased by 76%[12]. On the other hand, disabled people face a 68% higher risk of unemployment.

While these are important findings, what is the effect of Internet usage? A second model suggests, that while all other effects remain, using the Internet adds considerably to the explanatory power of the model. Other things (age, educational attainment, gender and health status) the same, being an Internet user reduces the unemployment risk by 74%[13]. Employability hence significantly increases

11 The same is true, however, for Poland, but data are insecure due to small numbers of observations for the Internet skilled.

12 In terms of odds ratios. With exp(b) =.244, the decreased risk is (1 - .244)= 76%.

13 As stated already, many may only through work use the Internet. However, another model, testing the effect of home access still finds a highly significant effect (exp(b)=.399, alpha<.001). On the other hand, Internet use may be strongly correlated with other explaining variables not observed in this model. Admitting this does not change the finding that there is empirically a strong statistical association between Internet use and employability

with ICT skills – and vice versa.[14]. This strongly supports evidence for ICT's potential to overcome exclusion.

Box 3: To what end are ICT being used in CEEC?

Sometimes the concern is expressed that ICT access alone will not suffice so as to make disadvantaged groups experience social or economic benefits. The worry prevails sometimes that "unproductive" uses of ICT, like video gaming, dubious chat fora, pornography, spending money on useless mobile phone ring tones or having them as mere status symbols (all of which there is no reason to believe would apply more to underprivileged users than to the better off) should not be fostered by pro access policies.

As a rough indicator of being disadvantaged we choose being unemployed vs. being employed (including self-employed). Among the activities not carried as much by unemployed users are e-Commerce (including information about products) and e-banking which may easily be explained by having little money to spend, and in many cases probably lacking a bank account. Consequently, not as many fell better informed as a consumer (46% vs. 63% if the employed).

E-mail is conspicuously also used less by unemployed Internet users which may support the interesting recent finding, that the Internet is hardly embraced as a communication tool by novice low income users (Jackson et al. 2004) simply because they do not have a sufficient network that also use the Internet. As regards Internet benefits, unemployed Internet users however see the same social benefits. Although fewer than average say it enhances contacts with friends, as many enjoy social participation enhanced through the Internet.

The unemployed Internet users however use eGovernment as much as others do, do a little less health research on-line and 37% of unemployed Internet users use it as a job search tool.

Table 9: Internet activities of users by labour force status

Percentages based on all Internet users in the respective groups. Weighted as CEEC totals.

	E-mail	E-mail with at least half of friends, family	Information on product or service	Order a product or service	Online-banking	Health information	Job search	eGovern-ment
Working	76	37	73	22	19	32	21	24
Unemployed	47	25	42	4	8	25	37	23
Other not working	54	30	56	9	4	28	19	21

Source: SIBIS survey data 2003, the author's calculations.

Table 10: Perceived Internet benefits of users by labour force status

Percentages based on all Internet users in the respective groups. Weighted as CEEC totals.

	Would be less well informed as a consumer without Internet	Would feel socially excluded without Internet	Would have less contact with friends
Working	63	35	58
Unemployed	46	34	46
Other not working	50	34	61

Source: SIBIS survey data 2003, the author's calculations

[14] It is however not possible to trace trajectories or persistence of social positions at the individual level. A further avenue for research thus is to longitudinally (either via panel approach or through more retrospective interviewing) analyse social structure and social mobility, including all its "traditional" well-known factors and parameters and add ICT information to the traditional variables and include in particular data about using ICT (which ICT, what skills level and what ICT use, etc), and then analyse the effects ICT may or may not have on individual social and economic transition processes.

4.2 Conclusion

It can be argued that there exists a circular relationship between labour force participation and the attainment of IT skills. Internet skills for the time being are a major factor to reduce individual unemployment risks. This might be due to a current relative scarceness of IT skills. As long as this scarceness prevails, IT skills are a significant competitive advantage in the labour market. But even if this competitive advantage was lost as skills become more widespread in the future, IT skills will still probably be a necessary basic condition of employability for many jobs.

5 National social and digital divides: match or mismatch?

One research question laid out at the beginning was to find out whether there are cases of mismatches between social and digital divides. In order to approach evidence for any such finding, beyond the relationship between GDP and uptake, which was dealt with previously, "cases" of social disparities in four countries are investigated and linked with ICT use of the respective at-risk groups. In the following, economic and social problems of four countries are depicted, building largely on the Joint Memoranda on Social Inclusion (JIM 2003). A case of social cohesion challenges is made for these countries and mapped with the respective national ICT and digital divide developments.

5.1 Insights in Estonia: Unemployment and ICT use

Estonia is still one of the poorest Member States of the enlarged EU, but has experienced rapid growth since 1995. The average GDP growth rate over the period of 1995-2002 was 5% per annum with a high growth rate also in 2001 and 2002 (respectively 6.5% and 6%). GDP per capita in Estonia increased during 1995-2002 from 32% to 42% of the EU average and is expected to reach 50% of the EU average by 2010. Estonia witnesses large inflows of FDI mostly of Swedish and Finnish origin.

The Joint Inclusion Report (JIM 2003) emphasises that continued foreign investment inflow apart from a continuing stable macroeconomic environment largely depends upon Estonia's capacity to further develop a labour force with sufficient skills.

Unemployment increased sharply in the first half of the 1990s – from 1.5% in 1991 to 9.7% in 1995 – mainly as a result of a reduction in the workforce in the course of economic and labour market restructuring. Unemployment was at 10.3% in (the second quarter of) 2002. Although there are relatively well performing sectors, a significant job growth and unemployment reduction is missing as yet. This owes mainly to unemployment being structural: in spite of high unemployment, there is a lack of qualified labour in Estonia. The education, skills and work experience acquired years ago are no longer competitive and do not meet the rapidly changing needs of the economy and the labour market. A large share of long-term unemployment prevails, affecting some 6% of the labour force.

The JIM (2003) identifies the following risk groups

- young people (the youth unemployment rate was 17.6% in 2002), who find it difficult to enter the labour market where high skills are demanded which can often only be gained from work experience and access to in-company training opportunities;
- long-term unemployed (particularly in the 45+ age group and with a low level of education or outdated qualifications), who formed 53% of the unemployed in 2002;
- people with disabilities and long-term health problems, whose employment rate is 25% compared to 61% of the non-disabled population of working age;
- non-Estonians, owing to the lack of Estonian language skills and their concentration in areas with high unemployment: unemployment was 7.9% of Estonians and 14.9% of non-Estonians in 2002.

With unemployment being one of the major concerns as to social cohesion in Estonia, we want to analyse how unemployed Estonians use ICT compared to the average user and find out whether or not the social divide from employment mirrors a digital divide.

Table 11: Unemployment and ICT use in Estonia

Percentage of users per group. CEEC and EU15 data weighted according to national population shares.

	Internet use	Computer use	Internet at home	Use of PIAPs	Mobile phone	eGovernment user
Estonia						
Total percentage	52	55	27	12	68	29
Unemployed	43	46	23	16	66	17
Ratio (unemployed/ total)	83%	85%	86%	138%	97%	59%
CEEC						
Total percentage	21.3	28.7	11.4	6.6	43.7	5.3
Unemployed	11.1	16.0	7.1	5.1	38.8	3.1
Ratio (unemployed/ total)	52%	56%	62%	77%	89%	58%
EU15						
Total percentage	46.4	53.3	44.1	5.6	69.1	18.7
Unemployed	37.9	46.3	41.0	6.4	69.4	19.9
Ratio (unemployed/ total)	82%	87%	93%	114%	100%	106%

Source: SIBIS survey data 2003, the author's calculations.

Unemployed persons in Estonia are using ICT to a large extent compared to other countries. In fact, e-inclusion of the unemployed is much better than in the other CEEC and equal to the average in EU-15. Almost half of the unemployed are computer users and almost one in four has access at home. Estonia obviously manages to integrate the unemployed into the Information Society. PIAPs seem to play some integrative role here, almost 2 in 5 unemployed Internet users rely at least *also* on PIAPs.

In Estonia, exclusion from the labour market does not to the same degree entail exclusion from the Information Society. Even allowing for the fact that there is rather high youth unemployment (17%), participation of the jobless to this can not only stem from younger generations of unemployed being Internet users[15]. On the other hand this also indicates that basic e-skills do not seem to be a bottleneck in the Estonian labour market and hence do not suffice as door opener as has also been shown previously.

However, one has to bear in mind that the unemployed population are a rather heterogeneous group. Many young unemployed may experience this as a transient episode, but unemployment has proved to be persistent for many, who may not be well versed at ICT.

Coming back to the initial question, is there is mismatch between social and digital divide, then? While the unemployed are of special concern to social cohesion in Estonia, with rather high unemployment rates and the highest degree of unemployment poverty, there appears not to be a special unemployment-related digital divide in Estonia.

[15] Breakdowns of the sample data by employment status and age and country can only give tentative answers because, despite national N=~1000, the number of observations soon becomes very low and statistical margins of uncertainty rather high. Yet, although also in Estonia usage diminishes with age, here older unemployed tend to be Internet users to a rather high degree.

5.2 Insights in Poland: Unemployment and ICT use

Compared with the enlarged EU, Poland is still a rather poor country in terms of GDP/head. Also, Poland has to face serious regional polarisation as regards economic performance. Furthermore, the 1990s recovery of the economy has recently witnessed a backlash, with only small growth rates in 2001 and 2002.

Economic restructuring has hit agriculture and old industries hard. Both have lost significantly in employment. Since 1998, the Polish economy has experienced a continuous loss of jobs and total employment in 2002 was 10.2% lower than in 1998. In 2002, the unemployment rate reached 19.9% (20.9% for women and 19.1% for men).

Employment rates fell strongly to 51.5% in 2002. It is especially low among younger cohorts, among which more people (some as a consequence of bad employment prospects) tend to attend higher education than in previous generations and so attain higher educational graduations.

The main challenges in Poland are (cf. also JIM 2003)

- High youth unemployment: the youth unemployment rate (15-24) was 41.7% in 2002, the increase in unemployment among school-leavers is of particular concern
- Higher unemployment among those with lower educational attainment levels. The unemployed with basic vocational and lower education levels accounted for 60.9% of the total number of unemployed claimants registered with labour offices in 2002. The unemployment rate for this group was 24.8%
- High and increasing long-term unemployment rate, which reached 10.9% in 2002; the long-term rate is higher for women (12.3%) than for men (9.7%). The long-term unemployment proportion was 54,4%;
- Overall low activity rate

Poland's unemployed do use the Internet much less than the population average, unlike in Estonia, Poland does not manage to provide participation in the Information Society to larger parts of its unemployed. Furthermore, with the necessary caution because of limited number of observations, unemployed who do use ICT in Poland tend to come from the 15-24 years cohort, older unemployed people and even from the middle age groups are much more excluded from ICT use than in Estonia.

It can hence be concluded that there is a close match between social and digital divide in Poland with regard to labour market participation.

Table 12: Unemployment and ICT use in Poland[16]

Percentage of users per group. CEEC and EU15 data weighted according to national population shares.

	Internet use	Computer use	Internet at home	Use of PIAPs	Mobile phone	eGovernment user
Poland						
Total percentage	20	26	13	6	38	4
Unemployed	11	15	8	6	30	3
Ratio (unemployed/ total)	57%	58%	59%	102%	79%	75%
CEEC						
Total percentage	21.3	28.7	11.4	6.6	43.7	5.3
Unemployed	11.1	16.0	7.1	5.1	38.8	3.1
Ratio (unemployed/ total)	52%	56%	62%	77%	89%	58%
EU15						
Total percentage	46.4	53.3	44.1	5.6	69.1	18.7
Unemployed	37.9	46.3	41.0	6.4	69.4	19.9
Ratio (unemployed/ total)	82%	87%	93%	114%	100%	106%

Source: SIBIS survey data 2003, the author's calculations

5.3 Insights in Hungary: Educational attainments and ICT use

Hungary has experienced steady economic growth since the second half of the 1990s. In the early 1990s, employment fell dramatically, while unemployment increased sharply. In 2002, the employment rate was 56.6%, which is among the lowest rates in the EU. Agriculture (6.2%) and industry (34.1%) have lost in employment share and 59.7% of employed people work in the services sector (compared to 68.8% in EU-15). There are increasing regional differences in unemployment and employment and sectoral activity. The low employment rate and high inactivity rate, as well as a mismatch of qualifications and skills of the labour force are causing concern in certain regions.

Unemployment is slowly decreasing and stands today at a low percentage of 5.8%. Long-term unemployed is 2.4% and youth unemployment is also among the lowest in the EU at 11.9%. But also the youth activity rate is deemed too low. As in several CEEC, low employment levels of the younger cohorts are associated with higher educational participation.

The main challenges in Hungary are (cf. also JIM 2003):

- the high inactivity rate/low employment rate
- the regional disparities (the regions of Northern Hungary and Northern Great Plain)
- Reform of the educational system to meet the labour market needs
- Equal opportunities for disadvantaged children in the education system and reduce the socio-economic dependence of educational attainment.

[16] As ICT adoption is quite differently advanced in Poland and Estonia, it is difficult to judge whether a divide in one country is bigger than the one in the other. The assessment whether one gap or divide is smaller or larger than another, or closing or widening, is a delicate topic and it is often (mis-)used in political argument (as described by Martin 2003). However, a univocally accepted quasi-objective measure to judge this does not exist. Unless one has good time series data that permit an assessment of the time lag between two societies or strata (Sicherl 2003), any such assessment is to some degree to be taken with a grain of salt. Both absolute percentage gaps and adoption ratios, but also differences between or ratios of odds ratios are depending on the overall adoption rate if one assumes S-curve developments within different social groups (cf. Hüsing/Selhofer 2004, Martin 2003).

- Integration of the Roma population in employment and education
- Integration of disabled and people with health problems in the labour market

As social stratification appears to be a major concern as regards educational outcome and integration, we want to analyse the social determination of and especially the educational impact on ICT use in Hungary and identify factors that hinder ICT uptake the most.

Table 13: ICT use in Hungary

Percentage of users per group

	Internet use	Computer use	Internet at home	Use of PIAPs	Mobile phone	eGovernment user
Unemployed	12	19	8	<1	60	<1
Low income	4	4	1	<1	33	1
Low education	3	7	4	<1	34	<1
Age 65+	<1	<1	<1	<1	19	<1
Illness/disability	3	9	4	<1	31	<1
Total	18	28	11	2	59	4

Source: SIBIS survey data 2003, the author's calculations

Hungary has an overall low level of ICT uptake. Such an early stage of adoption is usually dominated by early adopters that come from well educated and economically better off backgrounds. This is also the case for Hungary. Internet use and access and computer use is very low in all disadvantaged groups observed here, qualified to some extent by the uptake of the unemployed. Educational factors hinder uptake of Internet and computers. While differences are sharp in this regard, they are also significant for mobile phones. Only 34% of people with secondary education or less have a mobile phone, compared with an average 59%.

It has been observed that the less educated are excluded from the Information Society in many countries. How is the Hungarian situation to be assessed against this background: is the Hungarian situation exceptional or does it follow a generally observable phenomenon? To compare the educational determination we look at the relative uptake in the four educational groups as compared to the national average uptake. Students in Hungary are 4.4 times as often Internet users as is the Hungarian average, which is the highest figure in the EU25, while people with secondary or less schooling are only 0.19 as likely. People with university education are 2.7 times as often users, this is also the highest value observed. Altogether, Hungary has the fourth highest variation coefficient, meaning that only in Romania, Poland and Lithuania education is a larger determinant of Internet use

Hence, the educational divide that Hungary experiences is rather mirrored also in ICT uptake. There is a significant and very high educational digital divide. In terms of the initial question, there surely is no "mismatch" between social exclusion and digital exclusion as regards educational attainment.

Table 14: The educational variation in Internet uptake

Internet users per educational attainment groups as percent of country average. Total Internet use:Percent of users per country

	CZ	EE	HU	LV	LT	PL	SK	SI	BG	RO	BE	DK
Secondary and less (TEA 16)	19	25	**19**	14	7	1	15	4	3	0	21	44
Higher secondary (TEA 20)	81	78	**77**	67	46	53	81	85	83	50	89	93
Tertiary (TEA 21+)	187	129	**272**	130	129	217	192	145	216	197	134	111
Still studying	239	182	**440**	260	271	342	233	225	345	415	184	131
Total Internet use	34%	52%	**18%**	28%	30%	20%	25%	38%	21%	13%	45%	69%
Variation coefficient	66	56	**82**	78	89	88	67	71	81	97	56	34

	DE	EL	ES	FR	IE	IT	LU	NL	AT	PT	FI	SE	UK
Secondary and less (TEA 16)	61	18	29	20	42	22	21	36	59	10	22	39	63
Higher secondary (TEA 20)	97	80	93	86	76	119	97	95	96	104	95	97	108
Tertiary (TEA 21+)	128	153	130	154	132	145	134	119	126	212	115	108	132
Still studying	165	216	227	209	165	207	175	147	172	271	145	142	151
Total Internet use	53%	24%	35%	36%	52%	37%	52%	64%	54%	28%	63%	66%	61%
Variation coefficient	34	64	60	61	46	54	53	41	36	67	48	38	29

Source: SIBIS survey data 2003, the author's calculations.

5.4 Insights in Slovenia: Aged population and ICT use

Slovenia has the second highest GDP/head of the 10 New Member States and the most even income distribution. Unemployment is the third lowest at 6.5%. Slovenia is about to catch up in economic development, with growth levels of between 2.9 and 5.2% in recent years. The risk of poverty level is below the EU10 and EU 15 level but an increased poverty risk exists for older people (65+) and the unemployed. The employment rate almost reaches that of the EU 15, only old age employment is significantly lower.

The shares of agriculture and industrial activity are decreasing. The manufacturing sector recorded a positive restructuring process, characterised by an increased proportion of value added of capital intensive, innovative and export-oriented activities (chemical, metal, engineering industries and the production of electrical and optical equipment), while the proportion of labour intensive activities (textile industry and footwear manufacturing) dropped.

Concerning unemployment there is a slight gender gap: the annual unemployment rate is higher for women (6.4%) than for men (5.7%). The youth employment rate is 30.6% in 2002, which is lower than in EU-15 (40.6%), particularly for young women, which is a result of higher enrolment in secondary schools and universities but also due to higher unemployment of young women. The employment rate of older persons (age group 55-64) at 24.5% remains very low compared to the EU-15 average of 40.1%. People with a low educational level are particularly affected by unemployment. Among the registered unemployed there are around 27% without any basic vocational education, of which 3% with no school education and 24% without elementary education. This also results in a high level of long-term unemployment. Unemployment and very low activity rates are of particular concern among the Roma population.

The main challenges in Slovenia are (cf. also JIM 2003):

- Employment chances of the older population
- Labour participation of women
- Labour participation of people with a low educational level and no vocational educational

The research question coming from the Slovenian picture is this: Is the age divide that Slovenia experiences in terms of employment mirrored in a below average ICT affinity of the aged Slovenians compared to the other countries?

Table 15: ICT uptake by age groups in Slovenia

Percentage of users per age class.

Age group	Internet use	Computer use	Internet at home	Mobile phone
up to 24	77	86	54	99
25 to 49	46	62	41	90
50 to 64	15	27	26	64
65 and more	3	5	7	28
Total	37	49	34	76

Source: SIBIS survey data 2003, the author's calculations.

Older people use the Internet much less than the population average. Although 26% of those aged 50-64 and 7% of the 65 years and older have Internet access at home, in both groups less people actually use it (15% and 3% respectively). 28 percent of the 65+ age group have a mobile phone and 64 percent of the next younger group.

Comparing these findings with the situation in other European countries reveals however that the age influence on ICT uptake is not particularly more pronounced in Slovenia. As regards the low Internet uptake of the oldest age group, Slovenia is no exception at all. Although there are good examples of a relative smaller age divide, such as in Austria, the UK and Denmark, most other countries face the same challenges as Slovenia. Also Belgium, Greece, Spain, Portugal, France and Finland in the old EU-15 as well as Estonia, Hungary, Lithuania, and Poland do not even reach 10% of average Internet use in this age group.

Overall, the influence is smaller in the Czech Republic and Estonia, which are comparable as to the overall ICT uptake, however. But a higher influence is visible in Hungary, Lithuania and Poland as well as in Bulgaria and Romania. Spain is the most similar country to Slovenia with almost the same uptake rates by age group and in total. France and Italy, which are also comparable in total Internet uptake, however, show a slightly smaller age influence.

Evidently, the age divide in Slovenia is well mirrored in lower ICT uptake. But, to summarise, Slovenia is no exception from an all European rule in this regard.

Table 16: The age variation in Internet uptake

Internet users per age class as percent of country average. Total Internet use: Percentage of users per country.

Age group	CZ	EE	HU	LV	LT	PL	SK	SI	BG	RO	BE	DK
up to 24	195	169	272	216	226	280	190	206	260	255	171	136
25 to 49	115	125	116	121	102	99	113	123	119	100	138	119
50 to 64	54	63	37	43	40	64	30	41	43	24	51	93
65 and more	13	8	<1	12	<1	5	10	7	3	4	7	30
Total	33%	52%	18%	28%	30%	20%	24%	37%	21%	13%	45%	68%
Variation coefficient	72	67	98	81	93	92	84	82	92	103	71	42

Age group	DE	EL	ES	FR	IE	IT	LU	NL	AT	PT	FI	SE	UK
up to 24	159	225	209	174	160	197	165	146	175	240	145	142	143
25 to 49	130	113	103	127	105	131	109	114	116	113	128	123	123
50 to 64	76	28	48	52	68	52	79	98	63	28	70	100	83
65 and more	13	6	6	8	21	12	25	16	35	<1	7	24	32
Total	53%	24%	35%	36%	51%	37%	52%	63%	54%	28%	63%	66%	61%
Variation coefficient	59	92	83	71	58	73	53	51	55	98	62	46	45

Source: SIBIS survey data 2003, the author's calculations.

6 Conclusions

All New Member States considerably lag behind the EU-15 with regard to ICT adoption in the population, with the exception of Estonia. While digital divides appear to follow the dimensions of social structure that are associated with social inclusion or exclusion more or less everywhere, the size and shape of the digital divide vary considerably between countries. This makes targeted national strategies necessary, and reminds that there is scope for policy to react to digital divide challenges.

Two major issues appear to be of policy concern after having analysed the digital divides in the CEEC. The interrelation between IT skills, education and employability and the unusual divide between the youngest generations and the next older core work force age populations.

Analysis bluntly shows that Internet experience and IT savvyness have a very strong role to play in employability. At the same time, the unemployed and the less educated are sharply behind the population average concerning Internet and the use of computers. Given the fact that work is one if not the major agent in acquiring ICT skills and given the low level of ICT skills diagnosed for the unemployed, the situation resembles a vicious circle for those out of the production process and a virtuous circle for those within. It has been shown that unemployment is currently practically hardly a risk at all in CEEC for people who have Internet skills. In times of rampant unemployment in some of the countries, the unemployment rate of people with advanced Internet skills – i.e. using e-mail, search engines, downloading files and some other but by no means geeky skills – nowhere exceeds four percent. Further, analysis shows an amazingly high and significant effect of being an Internet user on the risk of unemployment – after controlling for educational attainment, age, gender and health status the risk is decreased by three fourths.

Both IT savvyness and employment are strongly associated with education. Controlling for other variables, education is very decisive in prediction of Internet use, such that educational attainment favours the tertiary educated over people with less schooling. The main influence of education, however, can yet be found for the status of being a student. The Information Society in the New Member States is to a much larger extent than in the western Member States a student and youth phenomenon as yet.

The younger generation virtually represents the ICT skill base of the New Member States. Even among otherwise disadvantaged youths IT skills are as widespread as amongst otherwise better off older generations. This is not to say that the digital divide does not take effect within the younger age groups. As these cohorts enter the labour market, special attention has to be brought towards those younger people still digitally excluded. They will face a much harder competition vis-à-vis an IT savvy majority of their age with better employment prospects.

For the time being, however, especially the middle age group of 25-49 year olds should be of concern. Considering that these cohorts will continue to constitute the core work force for the next decades, ICT skills supply is very scarce. Amazingly low skill levels are found among the unemployed and inactive people of this age but also only 13 percent of people in paid work have advanced skills.

Younger cohorts are much more skilled at ICT, which will affect productivity and competitiveness at the labour market while the skills of older, but even of the middle generations are at risk of being devaluated. This may in the mid to longer term entail changes to the social structure in the CEEC. Occupational positions held by middle aged cohorts are likely to be replaced by following generations earlier. While this may bring about social advancement for some, otherwise disadvantaged, young ones, this development in itself may entail the risk of a new, generational divide as well as shortages in sufficiently skilled labour force.

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8 Annex: Logistic regression analysis of unemployment

We use the data of all ten countries, and examine only the age groups 15-64 and those in (self-) employment or unemployment, thus excluding people in education and other inactive persons. To analyse the impact of different demographic and socio-economic variables on the risk of being unemployed, we use the binary logistic regression. The dependent variable is dichotomous (either being unemployed or employed). The independent variables are coded at categorical level. For interpretation the effect coefficient exp(b) which is the effect of the independent variable on the odds ratio of being unemployed is used.

Table: Logistic regression of unemployment

	Model 1			Model 2		
	Exp(B)	**Std.Dev.**	**Sig.**	**Exp(B)**	**Std.Dev.**	**Sig.**
Gender: female	**1.341**	.066	.000	**1.315**	.068	.000
Educational attainment: Reference: Secondary and less			.000			.000
Higher secondary	**.422**	.089	.000	**.507**	.091	.000
Tertiary	**.244**	.113	.000	**.413**	.118	.000
Age: Reference: up to 24			.000			.000
25-49	**.427**	.094	.000	**.370**	.098	.000
50-64	**.377**	.116	.000	**.305**	.120	.000
Presence of long standing illness or disability	**1.676**	.094	.000	**1.643**	.095	.000
Internet use				**.259**	.098	.000
Constant term	1.084	.116	.487	1.368	.120	.009
-2 Log-Likelihood			5740.3			5507.0
Cox & Snell R^2			.050			.087
Nagelkerke R^2			.077			.135
Number of observations			5809			5809

Source: SIBIS survey data, 2003, unweighted data, the author's calculations

Calculations are made using the binary logistic regression procedure in SPSS.

The logistic regression model is simply a non-linear transformation of the linear regression. For a case with two variables, the logit model is described as:

$$\ln\left(\frac{p_i}{1-p_i}\right) = a_1 + bx_i$$

with:

p is the probability that the event Y (i.e. unemployment) occurs, p(Y=1),

$\frac{p_i}{1-p_i}$ is the odds ratio, i.e. the probability of the event divided by the probability of the non-event,

$\ln\left(\frac{p_i}{1-p_i}\right)$ is the log odds ratio, or logit,

a is the coefficient on the constant term,

b is the coefficient(s) on the independent variable(s), and

x is the independent variable(s).