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Determinants of Diffusion and Productive Use of ICT: The broader European picture

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Acknowledgement

Over 200 experts and researchers, from Europe and abroad, have been involved at various stages of this same research program in original research, interviews and workshops. Some of them, part of the latest validation workshop, are listed in the Annex to this report. The authors wish to express their gratitude to all for their fertile contributions.

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ABSTRACT

This paper is based on past and current research about Information Society developments in an Enlarged Europe, carried out at the Institute for Prospective Technological Studies, a research institute of the Joint Research Centre Directorate General of the European Commission.

The research aimed at understanding and identifying Information Society strategies for the European countries that would support their economic and social development towards the Lisbon objectives. This paper presents some of the very global policy-oriented conclusions of this work, by focusing on one of its achievements: the identification of past and future determinants of IS developments in the Acceding and Candidate Countries (ACC13)³.

The analysis, and its broad discussion across a series of papers and expert workshops, identified 13 factors which, taken together, help better understanding the dynamics that have led to (more or less) successful IS-related development in those countries since the mid 90ies.

First, an analysis of both ICT production and ICT use in those countries, together with the assessment of national contextual factors, shows that six countries in spite of numerous differences can be assessed as more involved in both ICT usage and ICT production. These countries are Estonia, Malta, Slovenia, Hungary, Czech Republic and to a lesser extend Cyprus. In all cases, the process resembles rather one of catch-up than of leapfrogging, even if much has been written in related literature about the tremendous growth and potential of mobile telecommunications, about the excellence of the local skilled workforce as attractive factor for investment and entrepreneurship or about the importance of FDI flows to the an emerging ICT industry. The European Enlargement cannot generate a radical change in Europe's position on the Information Society front: the ICT production capacity is proportionally too small in ACC13 as compared to the global world capacity, while, reversely, the ICT use patterns have caught-up sufficiently in ACC13 as to avoid any significant collapse of existing access and use figures across the newly Enlarged Europe.

Together, GDP growth, available revenues and resulting expenditure patterns explain – but only partly - the positioning of “better-off” countries in terms of impacts on ICT use. But the various indicators and qualitative observations clearly show that besides economic growth and level of income other factors have equally been important in the spread of ICT, both in use

³ The Acceding and Candidate Countries (ACC13) 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,

and in production. Additionally, no clear causal relationship or simple correlation can be drawn between the ICT usage and the ICT production sides: obviously ICT use necessitates a (domestic) supply side for equipment, maintenance and development of local services. Possibly also, the presence of an ICT industry influences positively on the use of such technologies through a variety of direct and indirect activities (skills upgrade, equipment, awareness rising, lobbying, etc.). Still the available research does not demonstrate any clear-cut relation and contradictory examples abound.

These observations point at the importance of better understanding the contextual factors and conditions influencing the IS developments. While economic growth and the level of economic development have, as expected, been strongly correlated with ICT spending, some countries show a different pattern in ICT use or production, due to other country-specific factors.

The following box introduces briefly to those 13 factors. It helps to better understand the dynamics of development and the scope and role of public policies that can lead to (more or less) successful IS-related development, as they did in those countries since the mid 90ies.

The 13 determining Factors for IS-related developments in Europe

<p><u>EU25+ Common factors</u></p> <p><i>Economic factors</i></p> <p>1. Economic structural changes 2. FDI & other financing tools 3. Corporate Sector and ICT industry</p> <p><i>Political factors</i></p> <p>4. Committed and dialoguing IS policies 5. EU policies</p> <p><i>Cultural and Social factors</i></p> <p>6. Education 7. And other intangible assets</p>	<p><u>ACC13 Specific factors</u></p> <p><i>Economic factors</i></p> <p>8. Growth, Macro Economic Stability & Public Finances</p> <p><i>Political factors</i></p> <p>9. Regulation and related institutional settings</p> <p><i>Cultural and Social factors</i></p> <p>10. Consumption patterns</p>
<p><u>EU25+ Prospective factors towards 2010</u></p> <p>11. The threat of the new competitive pressure 12. Growing Social divides and the Information Society development 13. The Growth, Demography and Education squeeze</p>	

Poland, Romania, Slovakia, Slovenia. These 10 countries joined the EU in May 2004: Bulgaria and Romania are expected to join in 2007, while Turkey’s joining timing is under analysis.

These 13 factors can be organized in three separate groups:

- **EU25+ Common factors:** Seven factors that determine strongly Information Society developments are common to all observed European countries⁴. They are not specific to transition economies or countries in the process of accession, independent of them belonging or not to the European Union. Of course, the way those factors impact each of those countries has been specific to their earlier economic, political and social history, up to the point that this might have affected positively or negatively their IS developments.
- **ACC13 Specific factors:** Three factors are identified as specifically impacting the group of the 13 Acceding and Candidate Countries. These factors are deeply rooted in the past or present political and economic history of those countries and have influenced until now their IS developments in a much more determinant way than in the European Member States (of before 1st of May 2004).
- **EU25+ Prospective factors:** Three last factors determine strongly *the future*. They impact in a variable way each and any of the countries of the Enlarged Europe by 2010, and additionally might impact them indirectly, depending on how their European partners will address those issues. Those are the political challenges to come. They were less acute during the last decade and emerge now as additional issues, on top of those inherited from the past that might have been partly solved or not, such as the legacies in the economical structure or the health of public finances.

Both **Common and Specific** factors might still impact IS developments in those countries in the next decade, together with the **Prospective** ones. Those are not factors “of the past”: their future impact depends strongly on the degree to which the forces behind each factor have lost or not their initial strength. Such appreciation has to be done on a permanent basis at each national, and sometimes regional, level.

The sequential presentation of all 15 factors, and their categorisation in Common, Specific and Prospective is, of course, artificial, and does not acknowledge sufficiently their effective interaction. Still, there is no *ideal modelling of societal change*: the future is not predictable.

A second most important political message lies in those **three prospective factors**: these seem to be emerging as new drivers, at the turn of the Millennium:

⁴ Eighteen country case studies have been elaborated in the frame of this research program: IS developments were analysed in 5 Member States - Austria, Belgium (Flanders), Germany (Dresden), Greece and Ireland – and all 13 Acceding and Candidate Countries. All 18 national reports are publicly available. See references in the Annex.

- Changing Competitiveness and the unpreparedness of Innovation Systems
- Growing Social Divides and the (relative) role of ICTs
- Squeezed (skilled) labour supply in the Knowledge-based Society and the role of Education

These three factors are expected to have a strong effect on future IS developments during the coming decade and possibly beyond. They are thus essential new challenges for research and for policy.

Additionally, while specifically identified by studies focusing on the New member States and on the remaining three Candidate countries, these factors are expected to impact Europe as a whole. All Member States are confronted to these three factors, possibly in various degrees -, and all will be impacted by the way those challenges will be addressed by the neighbouring countries. The interdependency of European nations is such that while identifying the specificities of a country's context, we have to acknowledge that in an Enlarged Europe, these specificities and the way they are addressed impacts on us all.

These three challenges are a strong invitation for striking the right balance between Growth and Social cohesion across an Enlarged Europe, and between short term quantitative objectives and longer term generational processes. This will be the role of policy-making.

1. INTRODUCTION

This paper is based on past and current research carried out at the Institute for Prospective Technological Studies, a research institute of the Joint Research Center Directorate General of the European Commission.

The research line aimed at developing a view about the future outlook of the Information Society in an Enlarged Europe. This paper concentrates mainly on the results of a large study conducted in Acceding and Candidate Countries (ACC13)⁵ during 2003. Still it draws upon earlier results of studies conducted in Western Europe and/or on a thematic basis⁶.

Because of its synthetic status, this paper does not come upon any specific national data, nor even present international comparison or benchmarking: it aims mainly at identifying the various determinants of Information Society (IS) developments observed in Europe during the past decade and to point at emergent issues which might strongly impact future IS developments in the present decade and beyond.

The 2003 study itself, focusing on each of the Acceding and Candidate Countries, had to address major challenges: it constituted at the time a unique effort for gathering such information in those countries while confronting scarce data availability, little comparability and standardisation; it covered a multidisciplinary scope of themes, and aimed at contextualising the data in an Information Society perspective; further it cross-interpreted the various national analysis across the case studies and finally integrated the findings with a focus on IS developments at European level.

Although the many research teams located in their home countries had to confront these challenges if to achieve the research objectives, the results, reliable and evidence-based, help defining a further research agenda, as well as to point at relevant policy guidelines at European, national and regional level.

The present paper is organized in three chapters. The first chapter gives a very brief overview of the State-of-Affairs of IS developments in the ten New Member States and the remaining three Candidate Countries. The second chapter enters in more details concerning the essential determinants of IS developments as documented in 18 countries across Europe and in

⁵ The Acceding and Candidate Countries (ACC13) 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, Romania, Slovakia, Slovenia. These 10 countries joined the EU in May 2004: Bulgaria and Romania are expected to join in 2007, while Turkey's joining timing is under analysis.

⁶ Most corresponding references are quoted in the footnotes and in the annex 1

particular in the 13 countries concerned by the Enlargement process at the time of the study. The last chapter tries to draw some major conclusions in terms of research and policy.

1.1. The political background

Immediately after the fall of the Berlin wall in 1989, the European Union (EU15) and the ACC13 entered the process of so-called “Enlargement”: the aim was the latter joining the European Union. Ten out of these countries, the Acceding Countries joined the EU in May 2004: 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, Romania, Slovakia, and Slovenia. Bulgaria and Romania are expected to join in 2007, while Turkey’s joining timing is under analysis. These thirteen countries are named throughout the report as ACC13: the (10) Acceding and (3) Candidate Countries.

In 2000, the Council of European Ministers meeting in Lisbon⁷ formulated common targets for the EU society to reach by 2010, the so-called “Lisbon Strategy”:

“Europe has today set itself a new strategic goal for the next decade: to become the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion. Achieving this goal requires an overall strategy aimed at:

- *preparing the transition to a knowledge-based economy and society by better policies for the information society⁸ and R&D, as well as by stepping up the process of structural reform for competitiveness and innovation and by completing the internal market;*
- modernising the European social model, investing in people and combating social exclusion;
- sustaining the healthy economic outlook and favourable growth prospects by applying an appropriate macro-economic policy mix.

(...) The shift to a digital, knowledge-based economy, prompted by new goods and services, will be a powerful engine for growth, competitiveness and jobs. In addition, it will be capable of improving citizens’ quality of life and the environment”.

Clearly, Information and Communication Technologies (ICTs) were expected to play a key role in the Lisbon process, and all thirteen ACC13, while still striving to achieve the

⁷ European Council. Lisbon, March 2000

⁸ Italics are from the authors

conditions of the Enlargement process, signed up to the Lisbon strategy and its related Information Society (IS) Action Plan: eEurope⁹.

In such political framework, understanding and identifying Information Society strategies for the European countries, that would support their economic and social development towards the Lisbon objectives has become a clear research objective at IPTS. This paper presents some of the very global policy-oriented conclusions of this work, by focusing on one of its achievements: the identification of past and future determinants of IS developments in the ACC13.

1.2. The research framework

As part of a broader prospective project - "Enlargement Futures" -, the IPTS launched a large program of research on the issues of Information Society developments in the ACC13 since 2001.

This program¹⁰ has addressed an important series of questions of which the two following are briefly answered in the present paper:

- What is the current status and the prospects of the IS development in ACC13?
- Which are the most relevant factors that influence Information Society trajectories in Europe?

On these bases, the research results offer an argued platform, supported by research results, for debating the major challenges and the potential roles of European, national and regional policies regarding IS developments and the achievement of the Lisbon criteria.

The paper draws upon a variety of research effort conducted by European and - at the time - acceding and candidate countries research institutions, as well as the expertise of numerous experts from Europe and beyond.

More precisely, research into the particular conditions of each ACC13 has been carried out. This research has covered a data gathering analysis and a synthetic assessment exercise of economical, political and socio-cultural aspects influencing the development of ICT use and production in each of the countries.

⁹In December 1999: The eEurope initiative was launched by the European Commission to bring the benefits of the Information Society to all Europeans. In June 2000: the eEurope 2002 Action Plan was agreed by Heads of State and Government in Feira. The 13 Acceding and candidate countries launched a collective action mirroring the Action Plan on the occasion of the Göteborg European Council in June 2001, known as the eEurope+ Action Plan. Finally, the eEurope 2005 Action Plan was launched at the Seville European Council in June 2002 and endorsed by the Council of Ministers in the eEurope Resolution of January 2003.

¹⁰ Further details and reports can be found under: <http://fiste.jrc.es/>

The following table describes the economic, political, societal and cultural dimensions that have been analysed in those country monographs.

Box 1: Scope of the analysis of IS determinants in Acceding and Candidate Countries

Economical factors	<ol style="list-style-type: none">1. National and regional macroeconomic environment2. Industrial development and competitiveness3. Presence of most relevant economic activities for IST applications -IST penetration rates
Political factors	<ol style="list-style-type: none">1. Institutional capacities and regulatory frameworks2. National and regional IS policies and related institutional settings
Societal and cultural factors	<ol style="list-style-type: none">1. Educational sector2. Demographics trends3. Sociological and cultural trends

Simultaneously to a full qualitative analysis, the following quantitative indicators have been used to help defining the state-of-affairs of the ICT production and use.

The importance of the ICT production sector has been approached quantitatively with five indicators.

1. ICT market value
2. ICT sector share in production
3. ICT share in exports and
4. Trade balance in ICT
5. ICT's share in employment.

The level of ICT use has been observed with nine other quantitative indicators:

6. Access path,
7. Separately mobile and fixed line access,
8. Number of personal computers per 100 of population,
9. Number of net users,
10. Relative share of households online,
11. Share of ISDN lines and relative weight of broadband access,
12. Number of Internet hosts per 100 of population,
13. Internet access prices,
14. Index of Digital Divide.

Such attempt for quantitative assessment and analysis has both some similarities and differences with earlier attempts carried out by international organisations and benchmarking reports (*OECD, the WB, the UN, the eEU+, etc.*).

Finally the qualitative and quantitative cross-interpretation of the 13 national case studies has been processed by ICEG EC (Hungary) as coordinator of the 2003 research. A first draft report has been presented and challenged at an international expert workshop in February 2004, where all acceding and candidate countries had high-level experts from their research

community and relevant governmental departments¹¹. The present document aims at integrating essential aspects of those debates, focusing mainly on the issue of the determinants and deepening some aspects of their analysis

2. Current status and prospects for IS development in ACC13¹²

In spite of the methodological limitations of quantitative or qualitative analysis, a fair observation of the IS developments in ACC13 provides some insights of their status and prospects.

Over the last decade the ACC13, and in particular those of Eastern Europe have undergone radical changes in their economies, their institutional and political settings, their constitutional and legal frameworks and their social and labour regulations. These changes show their adaptability and capacity to meet the challenges they are confronted with, including those related to building a knowledge society.

Effectively, on the Information Society front, the ACC13 have been able to position themselves strongly both in terms of ICT production and of ICT application and use.

2.1. Developments in the ICT production sector

Five acceding and candidate countries, namely Estonia, Malta, Slovenia, Hungary and the Czech Republic are better positioned than the remaining eight ones in terms of ICT industry developments and of their relative weight in the domestic economy of those countries.(share in GDP, in manufacturing, in FDI, in export, etc..).

Several factors contributed to the emerging differences between the ACC-13 countries, including the inherited legacies, the quantity and quality of available human and physical capital, the economic policies pursued by the countries (especially with respect to privatisation and foreign direct investments), and the size of the economy.

FDI has taken a major role in those developments of the ICT sector. While the former inherited ICT production capacity - where it was available - showed largely to collapse during the economic transition period, the flows of investments from abroad, strongly dependent on the privatisation processes and their agendas have taken up the challenge of re-

¹¹ Annex 2 lists the experts that have participated in March 2004 to the International expert validation workshop of the 2003 study.

¹² This section is mainly inspired by: Gaspar P., Halasz A., Draft Synthesis Report (unpublished), January 2004. Burgelman J.-C., Gourova E., Bogdanowicz M., 2003.; Gourova E., Burgelman J.-C., Bogdanowicz M., Herrmann C., 2001.

industrialisation of many ACC13. Together with finances, FDI brought also technology transfer, production processes, new products and managerial capacities. Also, FDI flows while being proportionally very thin in greenfield investments, highly concentrated in the Telecommunications sector.

Though the very numerous ICT production initiatives in ACC13 demonstrate an obvious entrepreneurial mindset, most are still today dispersed and unconsolidated, and lag behind in terms of critical mass and economies of scale. Further reorganisation of the sector is still expectable, in particular in the areas of services and software and might rather benefit to larger foreign companies than to the numerous small domestic ones.

Observations about the ICT industry moving from Western Europe to Eastern Europe (“re-location”) are correct but overemphasized. These moves concern in first place manufacturing activities. Additionally, there are simultaneous moves further East from Hungary, Estonia, Malta or Czech Republic to Ukraine, Russia, and even more Eastwards to Asia (China). Those moves should be assessed as the expectable restructuring of global division of labour under market conditions, a kind of “fordisation” of production processes that might also benefit the enlarged Europe in terms of a shift away from traditional industrial activities (“legacies”) to more added-value and service-oriented ones. Certainly, it raises legitimate question concerning employment and skills’ preparedness of the European workforce.

Bearing in mind the global and cyclical nature of these industries, the achievements that are observable in those countries at the end of the 90ies should be assessed with caution and relevant strategies to support sound economic development of the sector should be further articulated for the XXIst century.

Because of the absolute size of those sectors, as of the corresponding national markets, the developments of the ICT sector in those countries cannot be seen as an opportunity for any major change of the “European production share” at global level. The larger countries among the ACC13, Poland, Romania and Turkey produce naturally more in absolute terms (and thus weight more in the global market) but their ICT supply side stays, economically speaking, little relevant as compared to the size of their national economies or that of the global ICT supply side. Enlargement a such does not provide an opportunity for transforming Europe’s role in ICT supply.

Consequently the following prospects regarding the ICT industry in ACC13 by 2010, might be expected under a “business-as-usual” scenario (all equal conditions):

- The creation and maintenance of a domestic and a foreign owned production capacity, delivering mainly if not exclusively (software and computer) services to the domestic market will be observable in all countries, proportionally to their markets and their average revenue growth. But the domestic ICT trade balances will usually stay negative, due to important imports in ICT manufactured goods.
- In some scarce cases, the consolidation of domestic ICT companies could succeed in niche (services) markets at global or at least regional level.
- Five (small) countries will keep an ICT sector proportionally more relevant in their national economy versus eight countries with economically little relevant ICT producing sectors from a national perspective. The “polarisation” in ICT production is rather predicted to maintain and grow, in the overall logic of “first movers” advantage. Those “first movers” might even benefit occasionally from a positive ICT trade balance.
- Among the three large countries, Poland can bet on the stability of some of its "domestic majors" (targeting a sufficient domestic market as buffer for cyclical crisis), and a dispersed set of SMEs as in all countries. Romania tries to build up its role as software developer, but rather in a sub region (Black sea market). Turkey will maintain its important manufacturing plants, but the progressive rise of the wages might support the transit towards other type of products.

In all cases, there is more "hope" in the software development (and computer services) sub sectors than in manufacturing. The future of the industry relies strongly on the more or less rapid diffusion of *ICT use* across households, businesses and government. It is an application-oriented industry that will maintain and develop in ACC13.

Generally and on average for the ACC-13 countries the share of ICT output in total is below the EU levels except for the few countries with a strong FDI penetration and production in these sectors. This also means that after the enlargement the ACC-13 countries' ICT sector should not change radically the size of the EU contribution in ICT-production worldwide. However, what may change is the internal division of labour in ICT production between the old and new Member States as the latter one could be competitive enough to attract some of ICT investments from the existing member states and the enlargement could result in a stronger reallocation of ICT production within the EU-25.

We have found little evidence about the potential role of open source or about an industrial offset due to the emergence of Ambient Intelligence¹³ in such area as Consumer Electronics: none of the available analysis offers evidence of such "wildcards" that would transform radically the quite linear scenarios described above.

¹³ With the possible and quite unique exception of one major Turkish company, merging its consumer electronic products with the latest developments of Ubiquitous Computing technologies. See also, about the concept of Ambient Intelligence: K. Ducatel, M. Bogdanowicz, F. Scapolo, J. Leitjen, J. C. Burgelman, 2001. Scenarios for Ambient Intelligence in 2010. EUR No: EUR 19763

Rather, the really determinant factors of ICT production development are strongly related to global market developments, technological and marketing cycles specific to this industry, domestic market developments (growth!), incoming FDI flows, foreign ownership (strongly favoured until now by the privatization process in the transition economies) and the accompanying introduction of new production lines, the transfer of technologies, of managerial capacities and of production processes, and last but not least, the obvious skills - partly inherited from the former context - and entrepreneurial mindset of the domestic workforce.

2.2. Developments in the ICT Use

In the area of ICT use, the image is a little more blurred. Analysing ICT use is a much more difficult task than observing the ICT production as the latter is “simply” a sector of the economy. ICT use mixes a quantitative and qualitative analysis of ICT penetration rates, access and use. It has to take stock of the differentiated behaviours of the households, the businesses and the governmental bodies, and has to acknowledge both content production and capabilities. Still, conclusions can be drawn.

The same countries – Slovenia, Estonia, Czech Republic, Malta - show again to be globally better positioned than the other ones, with mostly high rankings on any observable indicator. Hungary stands unexpectedly much weaker while Poland offers a better profile. Cyprus, that shows very little if any ICT production capacity, joins the group of “more intensive” ICT-using countries, while the remaining six countries – Latvia and Lithuania, Slovakia and the three Candidate Countries - are dispersed across a variety of weaker positions.

Together, GDP growth, available revenues and resulting expenditure patterns (the share of GDP on ICT expenditure is higher in countries with higher GDP: the effect is cumulative) explain – but only partly - the positioning of “better-off” countries in terms of impacts on ICT use. But the various indicators and qualitative observations clearly show that besides economic growth and level of income other factors have equally been important in the spread of ICT.

Further explanatory variables should be incorporated when considering for example Estonia’s position (low GDP per capita/ high ICT), the comparatively low ICT expenditure in Slovenia, or on the contrary the comparatively high expenditure in Slovakia and their resulting contrasted positioning. Furthermore, as compared to the EU15, in some areas such as mobile telephony, spectacular growth rates have allowed the ACC13 to catch up in technological

terms and to achieve, in some cases, above EU15 average penetration rates. While economic growth and the level of economic development have, as expected, been strongly correlated with ICT spending, some countries show a different pattern due to country specific factors, as further described in this report.

Still, one has to acknowledge that countries with lower per capita GDP are not in a position to catch-up even if showing tremendous ICT penetration growth rates. The value and the market share of ICT in candidate countries are much lower than in the majority of individual EU countries and the average of EU15: the corporate sector's contribution to the ICT market is smaller and households also spend much less in absolute and also in relative terms than in better off economies. But considering the experience of EU15 countries as well as the likely income convergence of most ACC13 we may expect that spending and consumption levels will increase and will result in much higher rates for ACC13 in the coming years.

In practice, this means that today all ACC13 have most ICT penetration rates at a lower level than EU15 average. Catch-up could simply result from convergence, even if very slowly. Still this correspondence is not absolute: on one hand, some countries with low GDP/capita do much better in specific indicators, while on the other hand and contrary to economic growth rates differentials, the ACC13 - EU15 gaps are sometimes widening (for example in PC penetration). It might be said that convergence towards EU15 average is taking place, but the process is highly dispersed: the dynamic picture (time series) confirms that the existing gaps have not always narrowed but in several cases have significantly widened due to the ACC13 / EU15 differences in growth rates since 1998. Furthermore, the overall economic situation in the ACC13 - and the resulting uneven revenue distribution - is widening the gaps *inside* each country, between the people, organizations, regions that can access advanced technologies and services and those for whom these stay out-of-reach. This has been again confirmed by the final eEurope+ progress report¹⁴ of February 2004

While the stock figures reflect those significant gaps inside, among and between ACC13 and EU15, time series data show also several positive developments as well. First, the speed of the expansion of both the use and supply of ICT has significantly increased in recent years: in most accession countries: one can observe an accelerated increase of penetration rates in the first years of the millennium. Moreover, the still low levels of ICT consumption, investment

¹⁴ This Final eEurope+ report closes down the specific IS action and benchmarking activity developed specifically for and with the ACC13 throughout the period 2000-2003. eEurope 2005 is its follow-up, common to all 25 Member States, and the remaining three Candidate countries Reference: eEurope+ 2003. Progress report, February 2004.

and output have been rising faster than in the second half of 1990s. Related, as it will be seen later, governments devote increasing attention to this sector as compared with late 1990s and this should also improve indicators.

Finally, while the common analysis of both ICT production and use, together with the assessment of national contextual factors, shows that a group of countries, in spite of numerous country differences, could be assessed as more involved in both ICT usage and ICT production, no clear causal relationship or simple correlation can be drawn for sure between the ICT usage and the ICT production sides: obviously ICT use necessitates a (domestic) supply side for equipment, maintenance and development of local services. Possibly also, the presence of an ICT industry influences positively on the use of such technologies through a variety of direct and indirect activities (skills upgrade, equipment, awareness rising, lobbying, etc.). Still the available research does not demonstrate any clear-cut relation.

These preliminary conclusions point at the importance of better understanding the contextual factors and conditions influencing the IS developments, described more in detail in the following chapter.

3. Determining Factors for IS developments in Europe

3.1. The 13 determining factors for IS developments in Europe

The last decade of IS development in the 15 European Member States and in the 13 Acceding and Candidate Countries provides a wealth of information concerning the determining factors of those national trajectories, set against the particular economic, industrial, historical, social and geographical context of the country or region concerned. It is thus worth looking at how given national/regional contexts have created - or not - favourable conditions for achieving IS-related development and what this has meant in each case.

Such analysis has been the purpose of a broad set of research - 18 national case studies - successively developed by research institutions from those countries in the frame of two research programs commissioned by IPTS.

This analysis, and its broad discussion across a series of papers and expert workshops, leads to identify 13 factors which, taken together, help understanding better the dynamics that have led to (more or less) successful IS-related development in those countries since the mid 90ies.

The following box introduces briefly to those 13 factors and offers a first approach of their organisation, as well as that of the rest of this chapter.

Box 2. The 13 determining Factors for IS-related developments in Europe

<p><u>EU25+ Common factors</u></p> <p><i>Economic factors</i></p> <ol style="list-style-type: none">1. Economic structural changes2. FDI & other financing tools3. Corporate Sector and ICT industry <p><i>Political factors</i></p> <ol style="list-style-type: none">4. Committed and dialoguing IS policies5. EU policies <p><i>Cultural and Social factors</i></p> <ol style="list-style-type: none">6. Education7. And other intangible assets	<p><u>ACC13 Specific factors</u></p> <p><i>Economic factors</i></p> <ol style="list-style-type: none">8. Growth, Macro Economic Stability & Public Finances <p><i>Political factors</i></p> <ol style="list-style-type: none">9. Regulation and related institutional settings <p><i>Cultural and Social factors</i></p> <ol style="list-style-type: none">10. Consumption patterns
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As shown above, these 13 factors can be organized in three separate groups:

- **EU25+ Common factors:** Seven factors are common to all observed European countries and have impacted their IS developments in all cases. They are not specific to transition economies or countries in the process of accession, independent of them belonging or not to the European Union. Of course, the way those factors impact each of those countries has been specific to their earlier economic, political and social history, up to the point that this might have affected positively or negatively their IS developments.

- **ACC13 Specific factors:** Three factors are identified as specific to the group of the 13 Acceding and Candidate Countries. These factors are deeply rooted in the past or present political and economic history of those countries and have influenced until now their IS developments in a much more determinant way than in the European Member States (of before 1st of May 2004).

- **EU25+ Prospective factors:** Three last factors determine strongly *the future*. They impact in a variable way each and any of the 28 European countries, and additionally might impact them indirectly, depending on how their European partners will address those issues. Those

are the political challenges to come. They were less acute during the last decade and emerge now as additional issues, on top of those inherited from the past that might have been solved (i.e. healthy public finances) or not (i.e. legacies in the economical structure).

Both **Common and Specific** factors might well also impact IS developments in those countries in the next decade, together with the **Prospective** ones. Those are not factors “of the past”: this depends strongly on the degree to which the forces behind each factor have lost or not their initial strength. Such appreciation has to be done on a permanent basis at each national, and sometimes regional, level.

The sequential presentation of all 15 factors, and their categorisation in **Common, Specific and Prospective** is, of course, artificial, and does not acknowledge sufficiently their effective interaction. Still, there is no ideal modelling of societal change: the future is not predictable.

The following sections give successively a brief overview of each of those groups of factors. They aim at making the inventory of arguments on each topic, and at inviting into analysing the available set of data and observations to better address each of the factors and assess each specific situation. It is a call for further in-depth research, rather than a tool for closing down the debate.

3.3 The seven European Common Determining Factors¹⁵

The analysis of national IS case studies across Europe identifies the following seven factors, which, taken together, help understanding essential aspects of the dynamics leading to (more or less) successful IS-related developments in Europe since the mid 90ies.

Box 3: The seven European Common factors

Economic factors:

- 1. Economic structural changes**
- 2. Role of FDI and other financing tools**
- 3. Corporate sector and the ICT industry**

Political factors:

- 4. Committed and dialoguing IS policies**
- 5. EU Policies**

Societal and Cultural factors:

- 6. Education**
- 7. And other intangible assets**

¹⁵ This section is mainly inspired by Bogdanowicz, M., Burgelman, J. C., Dunnewijk, T., Wintjes, R., Nauwelaerts, C., Weber, A., Dachs, B., Wagner, P., Ananos, M., Damvakeraki, T., Amanatidou, E., Landers, T., 2003; Bogdanowicz, M., Burgelman, J. C., Centeno, C., 2003; Bogdanowicz, M., Burgelman J.-C., 2003

Factor 1: The trend towards economic structural changes

Countries and regions may succeed - or may be doomed - in modernising or transforming their economic “traditional” structure mainly because of the increasing pressure of globalisation. Mature industrial products, that are no longer susceptible to large productivity improvements, are at risk of ending up in low cost/low wage surroundings. In order to maintain an economic activity and to develop - as a country or a region - there is the need to seize the right opportunities, by developing innovative products/services or becoming more productive in close-to-mature ones. In both cases, the inherited pre-existing industrial and service structure, and its interplay with ICTs, plays a major role.

ICTs appear to be the pervasive and supportive tools for the modernization of the economy, across sectors as well as sub-sectors. Relevant software production and adapted use of ICTs are then often at the core of IS strategies developed for the purpose of modernizing the economy.

Specific national or regional assets – including those in Services – can help to generate such ICT-using industries and are referred to as ‘sweet spots’, either ‘given’, historical, or strategically created on purpose. The challenge here is to identify those assets and to develop them.

In the case of the ACC13, ICT developments have been positively affected by two strong structural changes in the supply side of GDP that took place in the recent decade in ACC13 (in particular in transition economies): the decrease of industrial and agricultural sectors together with a growth of service sector in both ICT intensive (telecommunications, transport, wholesale, retail, storage, financial services) and non-ICT intensive services and in many cases a re-industrialisation process with the emergence of modern industries such as ICT production, chemical and machinery industries.

These structural changes have already influenced and are expected to continue positively influencing the IS developments by increasing ICT access and usage, in particular due to the ICT-intensive sectors. This is also expected to increase ICT production as the domestic markets grow. However, these deep structural changes are usually affecting simultaneously remaining legacies (coalmining, shipyards, heavy metals,...), which raise a number of challenges in terms of social impacts.

The “re-industrialisation” process, topical in transition economies, can thus be seen as a historical opportunity for the technological modernisation of the economic production at

large, in industry and services. The trends towards globalisation – not least the Single Market – puts further competitive pressure on all national economies, in transition and non-transition countries. A technological and managerial answer to this pressure, aimed at improving productivity, is necessary and possible when considering the potential use of ICT in advanced economies. There is room for governmental action as to create the right conditions for businesses to be innovative and improve their competitiveness on this technological basis. In some ACC13, there are observable trends in that direction.

Some of the ACC13 show still strong industrial and agricultural legacies. These, in particular when weakly producing or progressively collapsing are a burden for the Public Finances and a source of discontent menacing the social cohesion and political stability of the system. The presence of these legacies may be costly and critical for the IS developments. Besides general economic problems and costs these legacies deepen the regional and social divides and thus widen the digital divide as well. Regions which have collapsing industries or countries that have disproportionately high agricultural population and production may find it increasingly difficult to find popular support for IS developments amidst social and economic tensions.

The restructuring of these areas will be both costly and resulting in further tensions (growing unemployment, employment shifts, etc.) at least in the short term. The costs may be a burden for the public finances already stressed by financing conditions and difficulties. This may jeopardise in these countries the amount of public funding provided for the IS developments.

These structural problems may divert the attention of policy makers from IS developments as such structural policies may receive broader attention compared with IS ones. Governments may not be in position to weigh proportionately the short-term costs of structural problems versus the long term gains from IS developments. Obviously, this trade off may seriously influence the choices to be made in the future, reorienting possible investments, distracting from IS related priorities, etc.

Factor 2: The role of FDI and other financing tools

ICT-related development is an uncertain path as any societal transformation: it necessitates a broad scope of trial and error, and thus similarly broad and adaptive financial tools (Venture Capital, Seed Capital, or the protection of revenues through adequate regulation, for example) relevant to very diverse scales in initiative and risk. These are necessary to address the diversity of actors and starting points for innovative products and services to emerge.

An additional challenge is also to transform funding into knowledge transfers (Cooperation, R&D centres, Industry/university relations, etc.), incentives for investment into committed involvement in the domestic economy and society, isolated bets into spillovers that generate more sustainable and embedded benefits. To achieve these goals, financial tools themselves need to be integrated into a broader framework that encourages an entrepreneurial mindset. Without them, there is a risk that finances are devolved to possibly fragile mono-industrial aims and/or highly volatile initiatives.

In ACC13, a liberal approach towards foreign direct investments, accompanying the privatisation process, played a significant role in IS developments, mainly because FDI inflows accelerated industrial restructuring and the replacement of the former industrial sector. Three channels of effect of FDI on IS developments could be determined:

- The effect of foreign direct investments (both privatisation related and greenfield one) on ICT production.: the presence of a vibrant ICT industry and its share in the national economy often illustrates earlier important foreign ICT-targeted investments: it is the case in such countries as Hungary, the Czech Republic, Estonia and Malta.
- The modernising effect on non-ICT sectors of economy. As mentioned earlier FDI has been important both in modernizing the industrial and the service sectors and this modernisation has been followed by increasing demand for information and communication technologies.
- The embodied technology effect of foreign direct investments as they represent besides financing tools the human and technical know-how to reach the required higher productivity. In this sense, FDI has accelerated the modernisation of production in these countries. But contrary to the first two cases, its effect has been more mixed in this respect. In some countries foreign direct investments gradually evolved from wage related assembly-type investments towards more sophisticated ones including regional distribution, logistics, research and development centres, which allows establishing a much more diversified investment portfolio. 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 on limited financial resources (FDI) might have led some countries to improve attractiveness by lowering constraints on R&D or training facilities.

Although there seems to be an expectation that FDI flow will continue in ACC13 in the future, these expectations may be questioned by a number of factors, such as:

- The fact that a significant part of total FDI inflows have been closely linked to structural reforms together with the fact that the privatisation processes are well advanced;
- The low value added wage-based competitiveness that attracted FDI in some of the ACC13 is increasingly at risk, as economical development and income levels raise. However, due to the disparities among ACC13, diversion of this sort of FDI from more to less developed countries, while threatening the first, may create positive effects for the second.

These factors may raise the need for renewed FDI attractiveness policies taking better in account the progress made and the weaknesses of past policies concerning effective knowledge transfer.

Looking at the transformation of the financial sectors in ACC13, the first impression is that with non-insignificant country differences this has been a relative success story in the last decade. The three non-transition economies have also proceeded with strengthening the stability of their banking sector, with improving the access to financial services and making their financial sectors more competitive.

Still, the financial sectors of the accession and candidate countries are much underdeveloped compared to the EU-average.

- In case of major financial indicators reflecting the relative level of development (like M2/GDP, banking assets to GDP, stock market capitalisation to GDP), these are only at 25-40% of the comparable levels of the EU15, strongly limiting the financial intermediation carried out by the banking sector and capital markets.
- Another related weakness is the strong reliance in accession countries on banking sector financing and a significant underdevelopment of capital markets and equity financing. The lack of capital market financing is a strong weakness as it hampers the financing through venture capital, stock market issuance reducing the flexibility much needed in this sector.
- The banking sector of accession and candidate countries does not provide all financing instruments available in advanced financial sectors. The most striking consequences are in the financing of small and medium sized enterprises..
- The long-term funding opportunities are still limited or available in forms of foreign currency financing, bearing the exchange rate risk. Besides, the banking sector does not perform adequately the maturity transformation and thus the majority of assets are of short and medium term maturity. This creates problems for ICT investments, which are typically of longer term maturity, while the available sources are of shorter one.

Liberal and stimulating investment policies, both for foreign direct investment (FDI) and domestic investment, have in most of the countries, had positive effects in the receiving countries' economy. While the sources of FDI might diminish, the reinforcement of domestic financial instruments is an essential challenge.

Factor 3: The role of the corporate sector and of the ICT Industry

IS developments in ICT production as in ICT use, are evidently not an exclusive field of activity for the public authorities. The private sector holds a serious role in initiating projects and transforming our ways of working and living with ICTs.

Its role can be described as threefold: as major investor, the private sector adapts itself and its environment to the use of technology; as lobbying force, it participates to the establishment of the general conditions which it sees as most beneficial to its interests; as engine of growth, in particular in the case of the ICT industry, it participates to the creation of national wealth.

As said earlier about FDI, large foreign companies expanding geographically their activities with the support of important investments show to be essential actors of IS development, often concentrated in ICT intensive sectors (Telecommunications, banking sector and insurance, wholesale and retail), and in the ICT sector itself.

Another corporate actor for IS initiatives is to be found among the new ICT-using entrepreneurs. In ACC13, many new companies, often of small and medium size, are launched, trying to match and compete with equivalent businesses of EU15. Nevertheless, observable evidence in ACC13 does not seem to confirm that the take-up of ICTs and their relevant use in these companies can be assessed as massive, neither highly successful: the lack of financial resources (coupled with the difficulty of accessing such resources in the financial system), and the lack of managerial and technical know-how seems to constrain seriously the opportunities that such technological catch-up could offer.

A most important corporate actor for IS developments is the group of stronger domestic ICT producers. The core business of those companies is at the heart of IS development, both in producing these technologies, and delivering the accompanying services as in supporting their diffusion. In most countries, a notable lobby of ICT industrialists has been voicing for years in favour of further and more rapid absorption of the ICT in society. Finally, most authors agree to attribute to the ICT sector itself an important role in the accounting of growth and productivity of the late 90ies. During that period, several national economies have benefited from the contribution of ICT industries to added value and GDP growth, trade balance improvement, etc. Ireland, Finland, Sweden but also (to a lesser extend) Malta, Estonia, Hungary...have positioned themselves as “Tiger” economies, largely because of their ICT Manufacturing capacities and their economic impacts. In these cases, the presence of foreign and indigenous ICT manufacturing multinationals and/or that of a dynamic SME-sector that had successfully developed international niche-markets has been an essential ingredient to their domestic economic growth, as well as .the technological upgrade of their economies.

Factor 4: Committed and dialoguing IS policies

ICT-related developments do not develop spontaneously, even less in an inclusive way. Most if not all IS developments, when rather successful, were initiated by a strong pro-active public policy push. Rather than being centralised or top-down, these policies played a coordinating role, were adaptable and committed, allowed risk-taking and long-term objectives. They were often holistic - or multi-layered - and were concerned with the country's (economic), development as a whole rather than ICT production alone, and thus benefited from a broader set of interdepartmental co-operative means. Specifically IS policies were absorbed into the broader category of development policies covering economic development, industry policy, science and technology, employment, regional policy, innovation policy, education, media, etc. They were characterised by pro-activity (despite the high risk involved due to levels of uncertainty) and the apparent need for visible individual 'champions'. A key role for the government was to co-ordinate an on-going learning process and to create predictability for most partners. This was achieved by, for example, establishing innovative partnerships among actors and by creating clear policy goals and roadmaps.

In ACC13, the general features of IS policies are the following.

- The first half of 1990s was characterised by a relative unawareness of IS policies at governmental levels. As enlargement approached, IS related EU programs and the accession itself had mobilising effect allowing to overcome some of the delays. Still, with some exceptions (Estonia, Slovenia) the majority of countries missed the time opportunity to develop an early, independent and coherent IS strategy and only some elements of information society development could be found in the programs and goals of functional ministries. In some other countries programs started earlier but Governments did not pay enough attention to these policies (Slovakia, Lithuania) or policies have been of less relevance to the IS developments (Hungary). The main reason for this was the pressure from other structural problems, the lack of appropriate institutional and human capacities, and the strong lobbying power of other interest groups diverting both attention and funding sources from IS developments.
- Based on a recently acquired attention to IS policies, largely due to EU policies, all ACC13 have adopted concrete IS programs. The governments have defined IS policy targets, set the priorities and in a majority of cases established programs that outline the future of IS development in their country and also determine the major lines of concrete policy actions. These documents usually include also some longer-term vision. This is not

simply a bureaucratic change but also reflects the revised attention devoted at the governmental levels to IS policy issues as these strategic documents have become an integral part of government policies. Another recent development as compared with the earlier situation is that the strategic documents have been followed, in most but not all ACC13, by more descriptive policy measures which assign specified targets, tasks and also budgets for the implementation of the programs.

- The goals described in the national IS policies often reflect the eEurope initiative and the goals are fully in compliance with those general European trends. This refers both to targets and instruments of implementation. While this resemblance will facilitate EU compliance and the full participation in benchmarking exercises, it might insufficiently reflect the specificity of those countries contexts in terms of transformation of the economy, public bodies e-readiness or households consumption patterns.
- Bearing in mind the mentioned recent positive changes in the attention and attitude towards IS policies, several crucial weaknesses still are observable. There still might be a prevalence of a simplified understanding of IS policy among the political personnel and the public administrations in the ACC13: the major impacts of IS developments, such as Growth potentials or Digital Divide risks, are sometimes ignored or misunderstood. IS policies remain very fragmented, detailed action plans are sometimes missing or include incoherent elements, which makes the implementation of whole programs more difficult and time-consuming. Furthermore, there is still an obvious lack of appropriate funding sources at the regional level and a relatively low priority given in the budget discussion to IS developments needs, as compared with other ministerial budgets. IS policies have also little targeted and little developed initiatives towards the digitisation and use of content, in particular in the public sector.

‘Co-opetition’¹⁶ refers to the search for the right, creative mix of co-operation and competition, through, for example, the co-ordinated meeting of diverse – possibly competing - actors in a goal-focused and time-determined taskforce. This mix aims at creating mutually beneficial situations by providing diversity, and at generating synergies that may result in common goals and trajectories for all. This concept calls for innovative institutional arrangements in public policy management, and includes the delegation of decision-making

¹⁶ The word “coopetition” was coined during an earlier research phase concentrating on the IS developments in EU15. (See: Identifying factors of Success and Failure in European IST-related National/Regional Developments, Eds J.C.Burgelman, M. Bogdanowicz, 2003)

and implementation capacity, as well as a citizen/entrepreneur-oriented mindset. Possible areas for co-opetition frameworks are infrastructure development for the public good, a safe digital environment, standards and interoperability, and also education, societal assessments, democratic initiatives, and environment. Such institutional arrangements feed the idea that reciprocal responsibilities pay better than “Winner takes all” games. They may nevertheless result in privileged arrangements, which escape democratic control (nepotism) particularly because they seek consensus among a set of contradictory interests. Business mentality and ethics, and their relevance in a newly open market economy are cornerstones for such trustful co-operative schemes.

International, national, regional partnerships are necessary and successful but scale and scope might matter in co-opetition. The geographical scale or the technological scope may be too large for a given set of actors to ensure commitment and pursue a common goal. Smaller frameworks for co-opetition seem to be easier to handle, as shown by the successful examples of smaller countries or regional initiatives.

Governments play a particularly important role within co-opetition strategies. They must coordinate a diversity of actors at various scales and safeguard public interest and democratic representation. This role should also encompass the difficult issue of ‘policy learning’. The environment for policy makers and partner actors becomes highly complex and constraining.

In ACC13, the active participation of the private sector in the IS development seems to have risen until now little interest among the public authorities. Rather than finding ways of cooperating on common objectives, - including creating the right conditions for technology intensive businesses to develop - , public authorities do not, in most countries, engage too much in institutional settings which would clearly associate heterogeneous actors as partners in a network of “co-opetition” aiming at elaborating consensual objectives and action plans among the diversity of interests of such groups as the government and its administrations, private companies, unions and the NGOs representing the civil society. Most government have had so far great difficulties to establish a well functioning relationship with the private sector as to exchange on experiences and challenges or to agree on common goals while keeping away from lobbying issues. There seem also to be a weak tradition in ACC13 for the co-operation between governmental institutions and the civil society (NGOs, Unions, Consumer associations, etc.).

Factor 5: EU-policies

EU policies have had an important impact on IS development. In most cases they have supported development both by mandatory regulation frameworks and by awareness raising, direct subsidies or benchmarking initiatives.

Reciprocally, EU policies may also generate reverse effects. The focus on the EMU and the stability pact, and on the Enlargement process and its conditions, may have distracted some governments from other priorities. Also, mere repetition of actions and measures that have been considered efficient in other places, without proper consideration, may lead to few or uneven results. Rather than simply reproducing earlier EU trial and error, these could be used as excellent benchmarks. They could help the ACC13 ask the relevant questions and explore their own context before taking any action.

In ACC13, the accession process 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, even when not part of the “*Acquis Communautaire*”

This seems also to be the case for the IS policies. In all countries, beyond the encouraging effects of statistical improved gathering, 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 EU15 Member States.

In some matters, the accession to the EU, and the accompanying measures (Acquis, inflation of public administration duties and personnel, etc.) have been seen as generating contradictory effects or competing objectives, but in the case of IS policies, these have rather succeeded in raising awareness among national and regional governments across ACC13.

While the vast majority of analysed countries missed the time to develop an independent and coherent IS strategy during the 1990s, the situation has recently changed as governments recorded the existing gaps, as the participation in and demonstration effect of EU programs and goals (eEurope, Lisbon target) became more pressing, while the pressure from earlier structural problems eased and more attention was directed at 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 EU ones.

Nevertheless, when becoming full Member States, the ACC13 will have to define their own IS national and regional policies, rather than align them on European plans, which, even if consensual, aim rather at giving a common umbrella to national policies within the regime of subsidiarity. The potential benefits of the IS, at economic or social level, will in the future have first to be defined at national and regional level, while contributing simultaneously to develop a European way of developing the IS.

Factor 6: Education

Education plays a role as a foundation of successful IS developments, and has to be viewed in the longer-term. The upgrading of each generation's educational level is a central ingredient to development. Additionally, it is disputable whether our education systems should be more supply-side oriented, directly supporting necessary professional (ICT) skills or rather fostering a general ability for "learning to learn" and creativity (which our modern "knowledge" societies also urgently need)..

Among the social factors that have most positively influenced IS developments in ACC13 is the high educational level of the society. The inherited 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 comparing with other European countries and countries at the same income level. This allowed maintaining and improving general skills, as an important supply side factor that helps both in the production and use of ICTs in the ACC13.

A first observable trend of the 90ies has been the tremendous reforms that have transformed most educational systems in ACC13 during the last decade, with in particular a boosting effect on enrolment rates and educational achievements: a much greater proportion of the young generation is and will be enrolling in tertiary education. These changes have also produced a certain amount of difficulties which still have to be solved in most countries: the growth in quantity has been partly counterbalanced by a loss in quality due to the lack of sufficient resources as to confront such massive changes. A certain amount of observations, concerning both the declining financial inputs in primary and secondary levels, the ageing of the teacher's population as those of declining outputs in terms of functional literacy and still insufficient outputs in tertiary level graduates should be taken seriously. Briefly speaking, the educational systems in ACC13 still are in need of further reforms.

Second, ICTs have been emerging in the educational system, rather as equipments and specific subject for studying, than tools for learning or teaching. One might consider that the very first steps towards an integration of ICTs in the educational system have been (if only partly) achieved: hardware and internet access show in schools and universities at growing penetration rates and initiatives such as the Computer Driving Licences adopted by several countries are useful steps forward. Nevertheless, all actors agree on stating that much is still to be done to complete the picture and integrate ICTs in the educational process itself.

Finally, studies related to 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 as in Lifelong Education initiatives. The ACC13 do not seem to be confronted that far to any serious skills shortage, even if the industry occasionally complains about the mismatch of acquired skills. This generally high level of human capital has been conducive for the development of both the ICT production and ICT usage in businesses, public administrations and by individual users.

Another knowledge-related facet of IS developments relates rather to the innovation systems: R&D capacities, fundamental research and curiosity-oriented research, technology transfer mechanisms, patent regulation, innovation policies, managerial capacity towards innovation and entrepreneurship.. On this front ACC13 seem to show a rather weaker profile.

Factor 7: The other intangible assets

ACC13, as well as EU15 Member States, are benefiting from other intangible assets than that of Education. The creative use of context-specific factors have been pointed at as key factors for developing competitive advantages: ACC13 have been exploiting such country specific factors.

Geographical proximity is one of the most obvious of those assets, observable in terms of preferential trade or FDI flows. The special relation of the Baltics, in particular of Estonia, with the high tech Scandinavian cluster illustrates perfectly such opportunity. But in terms of FDI flows, the neighbourhood of Germany, Italy and Austria also plays a major explanatory role in numerous business deals and investments. Still it is useful to remind that other type of proximity may also play a role, even if less immediately observable. Proximity of language, and possibly culture, also facilitates a sense of proximity favourable for alliances and agreements: trust is a cornerstone for collaboration. The large Turkish speaking community around the world opens up potentials in terms of market access. Migration flows, and the use

of the related Diaspora, for developing further networks and access to foreign resources on a global level may play a role: considering the brain circulation as a major asset could be part of Bulgarian policies tomorrow.

(National) Identity building is another observable factor in some regional or national IS developments. Rather induced indirectly by the EU15 benchmarking exercises, it supports the creation of a (provisional) national or regional consensus around the image of a better future, made out of Growth and a worldly acknowledged image of modernity. Still in line with the European project, it positions the country or the Region on the top list of those representing the “best practice” around the continent.

Contrary to the cases of Ireland and Finland in Western Europe, the sense of crisis at national level, does not seem to have been a mobilising factor for the governments and the population towards the development of an Information Society. This might be due to at least two reasons: the absence of such sense of crisis, due itself to the observable progress in terms of political democracy and economic growth additionally complemented by other positive objectives such as those of Accession. Alternatively, it can be that the scope and emergency of other problems at social and economic level have been such that the potentials offered by the ICTs did not seem to correspond to any serious or realistic solutions to such challenges. Much of the “Bread *or* Broadband dilemma”¹⁷ argument is rooted in such perception.

In terms of intangible assets, strategic creativity matters more than the hurdles. Tackling these features – proximity, identity, crisis - seemingly hurdles to development at national or regional level, may in fact reveal opportunities for creating competitive advantages, including in terms of Information Society. Not addressing them actively, however, might turn them into real weaknesses.

¹⁷ The “Bread or Broadband dilemma” is an expression coined in 2001 by IPTS to point at the following issue: Only those courses of action that deal simultaneously with welfare issues *and* economic growth will be politically sustainable. Technology will only be seen as affordable, if it clearly contributes to citizens’ well being. In ACC13, policy-makers will be under huge pressure to respond to the legitimate acute short term needs of their population rather than the more long term problems of the roll out of an IS. Striking a balance between these two sets of policy objects is probably the most difficult policy challenge in that respect. (Extract from earlier reports)

3.3 The three ACC13-specific factors influencing IS developments¹⁸

Three specific ACC13 factors have been identified as influencing IS developments, mostly due to the inheritance of the ACC13 social, political and economical history.

Box 4: The three ACC13 Specific factors

Economic factors:

8. Growth, Macro economic stability and Public Finances

Political factors:

9. Regulation issues and their related Institutional settings

Societal and Cultural factors:

10. Changing consumption patterns

Factor 8: Growth, Macro economic stability, and Public Finances

Economic growth, and consequent GDP convergence, has been an important factor affecting IS development in the ACC13. Economic growth increased disposable incomes and private investments, pushing upwards the demand for ICT-based services: the increased use of mobile phones, of internet, and the growth in number of PCs was, among other behaviours, strongly due to income growth besides price decline. In some economies, growth was additionally partly driven by the expansion of ICT producing sectors, especially following the periods of fresh FDI inflows.

This convergence path was marked by the changing dynamics of economic growth. In the transition economies, the majority of countries experienced huge output collapses in the early 90ies and negative output growth. These years were then followed by a period showing different recovery patterns. Some economies were more rapid in recovery, while others started later and also at a much slower speed. Then, in more recent years the transition economies experienced high rates of economic growth that have allowed recuperating the early 90ies losses and reducing progressively some of the development gap between them and the EU15 average. The three “Mediterranean” countries have generally had favourable economic growth: Cyprus and Malta grew between 1991 and 2001 more than twice faster than the EU15 average and Turkey has also experienced high growth rates notwithstanding its repeated financial collapses.

¹⁸ This section is largely inspired by the national Reports and the Synthesis Report of the New Entrants Research (See Annex 1 under: “New Entrants Research Consortium Reports”)

Hence, economic growth has not shown a linear trend in all ACC13. A variety of factors including some external (Russian and other emerging market crises, the Balkan war, etc.) and some internal ones (inconsistent monetary and fiscal policies, fast but generally costly disinflation, etc.) have affected strongly the growth rates and GDP figures of some of the ACC13 such as for example in Slovakia (1999, currency crisis and subsequent restrictive macroeconomic policies), Lithuania (1999, Russian crisis), Turkey (macroeconomic imbalances, 1994 and 1999; earthquake, 1999).

Finally, the differences between the average level of economic development in the accession and candidate countries and the EU-15 ones are important but have been narrowing in recent years. This was mainly caused by the positive - and sometimes significant - growth differential between the ACC13 and the EU-15 average, and to a lesser extent by the broadly observed appreciation of most exchange rates. The average difference in GDP growth rates for the 1998-2002 period between the average of the EU15 and the CC-5¹⁹ countries was around 3%, between the EU-15 average and both the CC-10 and the ACC-13 average was around 2,5%. Exchange rate appreciation multiplied the per capita GDP growth in most of ACC13 countries (except Turkey for example) by increasing the Euro level of GDP. Real per capita growth differential and exchange rate appreciation helped in several cases to reduce the gap between the per head GDP of ACC13 and the EU-minimal level represented by Greece and Turkey²⁰.

On the oath of convergence, potential threats challenge the smooth continuity of growth. First, given the current gaps as well as the rates of growth, convergence has been slow: it is expected now to take from a generation to over-a-half century depending on the country (and the modelling exercise). Second, discontinuities in the economical growth haven't taken place leading occasionally to secondary recessions. If considering IS developments as correlated to GDP level while being simultaneously one of the factors of Growth, such observations are rather worrying.

The public funds devoted to IS development are seen to be essential. The recognition of the role ICTs play in competitiveness increase progressively the attention governments devote to information society programs and to creating the general or sector-specific business conditions that can be incentive toward innovation processes. Second, IS developments based

¹⁹ The CC-5 are the Poland, Slovakia, Czech Republic, Hungary and Slovenia.

²⁰ While these dynamic factors have been important and influential, they have not universally contributed to the observed narrowing gap: the second most advanced country Slovenia did not experience either significant positive gap in output growth vis-a-vis the EU-15 or exchange rate appreciation.

on public finances can occur in such areas as eGovernment, eHealth, eEducation, etc to favour both the supply-side development as the level of ICT literacy and demand across the country. Such initiatives also aim at improving the public services quality and efficiency.

In such context of slow and changing macro economic growth, several factors related to the state of Public Finances have influenced the *marge de manoeuvre* of the Public Authorities, and consequently the speed of development. First, almost all ACC 13 countries faced serious fiscal problems in term of fiscal deficit and high public debt. While not all will be heading towards the EMU with its strict implication for fiscal policies, they all need to respect public sector sustainability and keep their debt levels at reasonable levels: increasing capital investment from public sector will require strict and balanced fiscal policies. Second, the countries needed and still need to proceed with the regulation and the reduction of free public services under the program of public finance and public services reforms: these reforms initially will lead to increased costs and the benefits will occur only in medium term. Amidst vivid public sector reform the worsening of fiscal balances is likely, reducing further the likelihood that the remaining scarce public funds will be spent on IS investments.

In the short run, accession countries will need to manage the consequences of enlargement and the adjustment it still requires. Recent studies have shown that accession per se will worsen fiscal balances by 1,5-2% annually in the new Member States necessitating further adjustments in public finances. This additional burden needs to be integrated to the budgets. Together, stricter fiscal policies after accession due to the need to comply with the Stability & Growth pact, and the lack of innovative financing instruments preventing the use of the EU Structural Funds may be an unfavourable mix to economical growth. Accession related costs and constraints may thus negatively influence public and private finances

Some countries will also need to manage the political and economic costs of loosing regions or sectors. Therefore those pressing requirements and the narrow window of financial opportunities will force governments to curtail the attention and funding provided for IS policies and applications. This may again influence the path towards critical mass levels of IS applications, and if this is to happen, slow down in turn the IS related impacts on Growth as well as on improved public finances.

The fragility of public finances has meant and still means a serious threat to IS developments in almost all ACC13 countries. Among the ex transition countries the most serious challenges are faced by the Central European countries perhaps with the exception of Slovenia, which have accumulated high imbalances together with structural problems in the public sector.

Other countries experience less threats because their public finances are in a more sound situation both financially and also in structural terms.

Factor 9: Privatisation, regulation and their related institutional settings

The EU accession process has generated positive mobilising effects in the establishment of a regulatory framework. Interestingly, while the accession process has influenced part of the national policies, it has also facilitated the decision making process on some IS related subjects, even when not part of the *Acquis*.

The Lisbon strategy and objectives have also stimulated additional awareness of the economical and social cohesion drivers and challenges, as well as of the increasing role of ICTs in achieving these objectives.

Concerning the privatisation process in the Telecom sector, the divestiture in the incumbent operator has been an essential issue, as those countries which were late in this privatisation show to lag behind in the qualitative and also quantitative development of the telecommunications sector. Consequently, the date, timing and regulatory conditions of the privatisation process has thus had an observable, and quite expectable, influence on technical upgrading, quality and tariffs. It also radically influenced FDI flows in the ICT industry.

In spite of the fact that the telecommunications regulation has undergone significant reforms in most of the ACC13, gradually aligned with the new EU regulation, the real effects in price, quality, competitiveness, and penetration levels (universal service) have been limited.

While privatisation rather supported IS developments, regulation generally had a negative effect, as regulatory policies were insufficient, inadequate and serious loopholes and adverse effect of pressure groups was felt.

The major problem with regulatory policies was that the market power of the incumbent operator was not regulated appropriately in most countries and thus in the course of privatisation public monopolies were simply replaced by private ones. While this could have been justified in the initial years by huge fixed investments needed to upgrade services, this became less justified when the supply side improved considerably, when mobile operators emerged and started to offer competitive services. Often National Regulation Authorities were maintained in a weak position and the incumbent operators used all efforts to preserve their market positions by influencing those regulators.

A resulting weakness was that the liberalisation of services observed in the 1990s in advanced economies did not occur and that the pressure exerted by the strong lobbying pressure of the incumbent prevented the development of competitive markets, with the exception of mobile services: there is still very little effective competition in the fixed line segment of telecommunication in ACC13.

Another reason is linked to the privatisation deals which in several cases explicitly granted fixed returns for incumbent operators and limited the scope of appropriate regulatory policies.

The current challenges for an effective liberalisation of the telecommunications sector are mostly linked to the weak institutional settings, including the National Regulatory Agencies (NRAs), facing limited human and financial resources, together with the strong lobby power of incumbent operators. These reasons together generate such negative effects as little effective competition in fixed lines market, regulatory weakness illustrated by slow processing of legal proposals, inappropriate competition policy, a lack of price regulation and lack of measures against unfair competition, pointing at an abuse of the monopolistic power. An additional (negative) consequence is the diversion of the consumer demand towards alternative services and solutions: fixed line penetration is stagnating in favour of mobile phone penetration.

In parallel, a weak regulation or the weak enforcement of IS regulation on security, e-commerce and e-signature are also reported to negatively affect IS developments. For example, the lack of regulation on IPR violation or security, or its weak enforcement, is reported to hinder the demand for e-services, due to an insufficient business return in the first case, or lack of consumer trust on the second.

Factor 10: Changing consumption patterns

Evidently, the economical development in ACC13 is leading to an increase in purchasing power, as income levels are increasing faster than prices. This evolution of purchasing power has a positive direct impact on the demand side for ICT goods and services, as an increasing share of the income is available for other than basic goods and services. Still, the purchasing power is well below the EU15 average both in absolute terms and in relation to price level convergence. Measured both by the actual and long run equilibrium exchange rate purchasing power does not exceed half of the average of the EU15.

Initially, the consumption structure of households is quite different in accession countries as higher share of incomes is devoted to primary consumption. As a result less can be devoted

for IS application and services: the income and composition effects simultaneously reduce the amount of disposable income available for the purchase of IS services and products. But societal changes in urban and sub-urban areas driving changes in the ways-of-life, in the structure of families, in leisure time and finally consumption patterns, lead to an increased share of income devoted to leisure and telecommunications. Finally, the increasing consumption credit levels provided by the banking sector are also (favourably) influencing consumer patterns.

Considering these initial conditions one can observe a continuous rise in consumption and incomes devoted for ICTs applications. This should be a sustainable trend. All recent forecasts project continuous convergence of the accession and candidate countries towards the average EU15 income levels. While the convergence speed and path is country specific and depends on various economic and policy related factors, these countries will gradually reduce the income gap between them and the advanced countries. Second, as incomes increase less will be devoted for primary consumption and more affluent societies and citizens will afford higher expenditures on ICT related items. The currently rather weak and fragmented middle classes are expected to expand and this will lead to a more solid foundation for the growth of IS related consumption. Private consumption will be supported not only by income growth but also by already observable structural and institutional changes: the banking sector increasingly finances households and the share of consumption credit has been increasing (from a very low starting level giving huge scope for growth), the level of indebtedness of households is low and might increase fast to reach up to one third of EU levels. These factors show that there will be better opportunities to increase household consumption and the share of IS applications in total consumption.

3.4 Three emerging factors expected to influence future IS developments²¹

The analysis of the ACC13 national monographs points at three emerging factors, that are expected to have a strong effect in future IS developments during the first decade of the new millennium, and possibly beyond. These three factors are thus essential new challenges for research and policy.

While being specifically identified by studies that were focusing on the New member States and on the remaining three candidate countries, these factors will impact Europe as a whole.

²¹ This section is largely inspired by the conclusions of the February 2004 Expert Workshop (See Annex 2) and the Synthesis Report of the New Entrants Research (See Annex 1 under: “New Entrants Research Consortium Reports”)

All our countries are confronted to such factors, possibly in various degrees -, and all countries will be impacted by the way those challenges will be addressed by the countries most impacted. The interdependency of European nations is such that while identifying the specificities of a country's context, we have to acknowledge that in an Enlarged Europe, these specificities and the way they are addressed impacts on us all.

Box 5: The three Emerging factors

Economic factors:

11. Changing Competitive Pressure: the need for Innovation

Political factors:

12. Growing Social Divides and the Information Society development

Societal and Cultural factors:

13. Emerging Growth/Demography squeeze: Education as an answer

Factor 11: The Changing competitive pressure: the need for innovation

The low-wages/high skills competitiveness of the ACC13

In the nineties, the ACC13 have benefited from a wave of privatisation and accession-related foreign investments, as well as from plants relocation. Much of these moves do find most of their explanation in the benefits to companies resulting from cost differentials: low wages and well educated workforce generated a major competitive advantage located in the ACC13. Other factors have of course also played an important role in these investment trends such as privatisation itself, liberal taxation schemes, attractive conditions for FDI, proximity to markets, etc.

No doubt also that many of those business-related investments have brought with them a series of other benefits in terms of knowledge and technology transfer, improved management, production processes, etc.

While an important driving factor of FDI inflows was the comparatively low wage level of ACC13 countries, some of them have lost partly this advantage due to the progressive increase of real wages and income levels. The strongest wage increases have been observed in the Central European and Baltic states, and there the outflow of FDI has already occurred to lower wage level countries such as in particular the Former Soviet Union, South-eastern European countries (Romania, Bulgaria, but also Ukraine, Moldavia) and further to Asia (China).

Concerning the ICT industry, the wage growth is a threat to those countries which have already established solid production facilities and have recently experienced wage increases sometimes outpacing productivity growth. This is especially a problem in Hungary and to smaller extent in Estonia and the Czech Republic. In the case of other countries (notably Romania, Bulgaria) wage stability might be rather beneficial and this may accelerate the re-location of ICT production within their region on the short term.

The future Member States are seen as having greatly benefited from those various flows to the extent that they are sometimes perceived in EU15 as a threat to industry and services for the rest of Europe: the new EU Member States, being then portrayed as Trojan competitors, competing on the basis of unfair conditions of labour costs.

Globalisation is thus knocking at everybody's door. Observable industry relocation across Europe - from Western to Eastern Europe - is rather a consequence of the necessary restructuring of our European economy towards the XXI century. Geographically speaking, more important moves are those transforming radically the global division of labour, reallocating in Asia many essential (manufacturing) industries and leaving Europe with the challenge of specialising on knowledge and technology-intensive economic activities, on services and niche markets, on quality and tailoring, etc..

Tomorrow's challenge: the changing competitive pressure

The new challenge facing today the new member states, is to sustain Growth in other ways than those of the nineties when the reduction of employment as essential factor of productivity gains and wage-based competition allowed foreign investments to flourish. Competitiveness will now have to match another type of criteria: those of the knowledge-based competition, of innovation, of product and service development, of quality, of niche markets. While real convergence is happening, further dislocation of FDI and of favourable relocation should occur. The progressive loss of wage-based competitiveness, due to the success of the convergence trajectory, induces the necessity to shift to higher value added production. This goes also for the particular case of ICT products and services.

The structural transformation of the ACC13, in particular of the transition countries, offers a wealth of opportunities for the technological modernisation of various sectors, a modernisation that has not yet fully happened. There are three likely developments shaping this technological modernisation.

First, is the growth of the service sector. Beyond the expected ICT-intensive using activities of telecommunications or banking, less technology intensive service sectors could benefit from ICT investment and innovation, be the general business conditions correctly set.

Second, the observed re-industrialisation of several countries offers the same opportunities, with possibly some room for global high tech industries if those activities succeed in integrating transnational networks of production and sale, or if they succeed in identifying niche markets with specific competitive advantages. For all such industrial and services initiatives, the ACC13 may prepare today, on the basis of pre-existing advantages such as a seriously skilled workforce or adequate market frameworks.

Third, the ACC13 countries all need to reform the provision of public goods and proceed fast with public finance reforms. There is a great opportunity in these countries to connect the reform of the health sector, of the public administration, of education, of the public sector employment, or of transport with the more extensive use of information and communication technologies. These could simultaneously free the domestic economies and public finances from the burden of financing the current level of public goods, as well as improve the quality of public services.

Some factors may also neutralise the negative effect of wage competitiveness loss. For example, it appears from empirical surveys that the relocation of FDI due to wage problems is linked mainly to bigger multinational companies with global production chains. In case of small and medium size investors, which make much of the invested capital, this is costly and stays outside their corporate strategy. In their case other factors (knowledge and proximity of the market, common cultural background) weigh to the same extent. Thus besides focusing on large international investments ACC13 countries need to give more attention to investment coming from SMEs.

The technical modernisation of the economy would be especially strong in countries which have been significant net recipients of foreign direct investment inflows and where the investment levels have been high. These countries (Estonia, Czech Republic, Hungary, Poland and Slovakia) may expect further significant investments both from domestic and external sources and these outlays will contribute to technical modernisation, which is also beneficial for ICT production. In other countries the technical modernisation and increase of competitiveness and value added content might be slower.

Assessing the past decade, it is also essential to acknowledge that, while struggling with an important set of issues related to Transition and to the European Accession, the new Member States have had little opportunity to focus their human and financial resources, their political priorities and even their companies' business plans on those issues that show to be relevant for tomorrow: adapt the innovation systems by boosting the R&D, framing FDI flows in longer term development patterns, concentrating on high end production rather than on already "past" challenges of the 90ies such as on restructuring industrial legacies or even simply on meeting basic consumption needs.

It may have been assumed that the effect of integration to the Single Market and the emerging competitiveness pressures from further globalisation would "naturally" become a supply side factor that would increasingly influence the spread of ICT at corporate level as these technologies are a source of productivity supportive to competitiveness. But the competitive pressure is rather a challenge than an opportunity: as such it will not generate the relevant reaction.

To address this challenge through technology-related productivity increases or innovative products, ACC13 need to develop the right mix of managerial awareness in the corporate sector, supportive and knowledge-intensive FDI flows, private sector's relevant position in global corporate networks, R&D and investment capacities, managerial and technical skills, supportive policies for technology related investments and for innovation, etc.

At the turn of the Millennium, the new Member States can be seen as insufficiently prepared - in particular in terms of integrated Innovation policies - for the new competitive pressure that will result from both accession and (progressive) convergence.

Factor 12: Growing Social divides and the IS development

Today's situation in terms of social cohesion

Growth in itself is no societal panacea. While the European project is rooted from its early years in the ambitions of Social Cohesion - a theme that is explicitly reaffirmed in the Lisbon process, more and further social divides rather undermine both the credibility of the European model, as well as more pragmatically the political stability of the governments in place. At the turn of the Millennium, all Member States have an immense responsibility in avoiding Europe to confront social divides that would contradict its own basic principles. At European level also, there is room for supporting directly or indirectly all necessary national measures at legal, institutional or social level.

Today, there are widespread disparities across all ACC13. They include income gaps, unemployment differentials, access rates to basic infrastructures, regional but also generational, gender or minority-related gaps. From the point of view of the IS developments the digital divide is the most observable one.

Perhaps with the exception of Cyprus and Malta the regional and social disparities have been increasing in ACC13 countries in the last decade. Due to the presence of structural problems, the need to reform and streamline the provision of public services as well as the effects of fast growth, all ACC13 countries have faced a period of increasing social disparities and associated tensions. The extent of these depends on the past speed of structural adjustments and growth, the relevance of distributive policies and, but to a minor extent, the ability of countries to absorb external funds to support such cohesion policies.

Even in a fast “catch up scenario”, one may not expect a fast decline of those disparities. Just to the contrary, broader disparities are likely to emerge during the present decade.

First, accession will increasingly require adjustment from the countries and this will be another selection mechanism for catching up and lagging behind regions, professions and social groups. Accession is also burdened by the past structural weaknesses and legacies which are painful to overcome - such as for example the trade-off productivity/employment - and which result in further social divides and gaps. Second, accession is costly in fiscal terms with the burden falling disproportionately on various social groups and regions. Third, one should not forget that several countries have very poor starting indicators in terms of unemployment, long term unemployment or GINI coefficients and it will be very difficult for them to make the necessary adjustment from their current level of disparities.

Another facet of the social divides has its clue in the deep reforms that the social systems of most of those countries have been and still are witnessing. The weak public finances could not sustain the conjugated and growing pressures of unemployment, poverty, health and pensions allocations while having simultaneously to invest in the future by transforming their own administration, boosting the Education, reorganising their taxation schemes or attracting foreign companies and investments. While reforming the Pensions, the Labour, the Education or the Health systems, the New Member States haven't been in a financial or political position for maintaining earlier social programs or guaranteeing to cope with all social distress.

Third, even convergence is not expected to bring the reduction of regional or social divides. Considering the validity of the trade-off claim that national convergence in the EU has been

accompanied by regional divergence, one may expect that countries successful in catch up will increasingly see broadening social and regional disparities. In ACC13, the growth trend has stricken in an uneven way. It concentrates in major cities - in particular capitals - and diffuses little if at all to the peripheries. What has been observable is a growing regional divide, affecting in particular rural areas, provincial towns constituted around old industrial legacies or border regions. It sometimes has simply reactivated very ancient divisions of the country, but in most cases it participates to a so-called vicious circle of impoverishment mixing the lack of production resources, human capabilities and investment attractiveness. The corresponding regional and local political institutions lack often the effective status and resources to mobilise and coordinate the necessary activities of redeployment.

Tomorrow's social challenges in the development of the Information Society

With enlargement it is estimated that the income dispersion between regions in EU25+ will double relative to that existing in the current EU15²². In such circumstances, there is a very high risk of developing a complex digital divide between and within groups of European countries, among sectors and businesses, generations and cultures, etc even if such divides, at closer look, does not necessarily always match the social ones. Such pronounced digital and social divide would weaken the European and the national economies, their social cohesion, the building of democracy in the ACC13, and would run counter to the European objective of an inclusive Information Society.

The structural weaknesses and problems may have two additional unwelcome consequences for IS developments. On the one hand, they may divert resources and political attention from IS development to manage the short-term policy strains, and problems. Second, they may give rise to political pressure lobbying indirectly against IS developments and directly in favour of industrial, regional or agricultural policies. The political impact of industrial and agricultural legacies is the strongest in countries which face the most serious structural challenges, as there the pressure groups may exert significant power to derail IS developments.

Reversely, the likelihood that IS developments and policies may help in managing social tensions resulting from structural legacies is unrealistic. In such domain, avoiding the creation of an extra level of social disparity - that would be based on technological illiteracy or upon the absence of use - is a first and legitimate goal to be achieved. Second, when properly used, ICTs can possibly support a variety of tools and contexts to relieve populations from the

impacts of social division, in terms of community building, access to information and education, economic activity or increased efficiency of public services. The “innovation paradox”²³ claiming that all innovations serve first the better-off has to be challenged: policy making has a role to play in such area.

But the political, administrative and financial ability of countries, and even more of weaker regions in those countries, to absorb internal and external (EU) funds available for the development of the IS is a matter of concern.

- In the case of financial capacities the provision of national co-financing and the division of this between different levels of decentralised government is only an emerging issue in candidate and accession countries. But one needs to consider that neither local governments, nor central ones or the NUTS II regional units have sufficient funds to participate in EU funded programs. They sometimes still lack basic legitimacy at central level. On the other hand other innovative financing instruments (pre-financing by banks or government financing institutions) are under development, but they should be regarded as being far from smooth functioning.
- The administrative capacities are equally a problem. The public administrations in ACC13 have limited preparation for managing such projects, and while the institutional settings have been established in almost all countries deemed for support, their functioning remain an open and a disputable question. Accession countries need to reinforce the institutional and regulatory framework to absorb the funds coming from the EU, including the ability to proceed with grants and applications from the EU, to finance their own part of the projects and programs, to establish monitoring and funds generating institutions, as well as spending or assessing structures.

In case these measures and institutional developments are developed too slowly, the new entrants will not be able to utilise the funds for social cohesion and for the development of information and communication technologies. While the problems are manageable, they need to be addressed urgently. In that respect the current accession countries receiving EU funding will face the issue of how to increase the absorptive capacity of their economies and to channel the EU funds towards development. Partly, this question is still a political one: economic, social or IS policies tend to be conceptualised at national level, while regional authorities lack legitimacy to position themselves as relevant actors.

Politically, social disparities and the resulting Digital Divide challenge the capacity of national and regional governments to confront:

- necessary economic restructuring and the adequate accompanying measures to moderate their social impacts , possibly build upon ICTs

²² Stated in: European Commission, 2000. The Second Report on Economic and Social Cohesion. European Commission. Brussels. Belgium

²³ Coined by Rogers, E. M. (1995) in *Diffusion of innovations*. New York: The Free Press (Fourth Edition).

- the essential reinforcement of “intermediary institutions”- such as regional and local authorities - in their role of political, economic and social actors
- the reform paths of the major social programs and the modernisation of their institutions - a challenge to eGovernment and eHealth
- and the strategic usage of public national and international funds for such aims in particular in such terms as those of Structural European Funds

All those are challenges to be addressed during this decade.

Factor 13: Emerging Growth/Demography squeeze: Education as an answer

Today's situation in Education

An important documented strength of ACC13 is the good supply of human capital. Compared with economies at similar levels of economic development these countries have much better and more equally supplied human capital, well-trained labour force and a highly skilled population.

This is an asset clearly inherited from the past institutional settings in the educational area, supported by a high share of GDP devoted to education, compared to EU15 average.

Close observation of the educational system also shows that ACCs at least match Western European standards in technological education. There are several areas where some of the countries are specially strong (like natural sciences and engineering in Central Europe) and also some where they have been particularly weak (Language capabilities). Some further good news relate to the progressive introduction of ICTs in education, planned efforts to improve the quality of education, or the European targeted 3% spending on R&D.

Current trends in Education - such as privatization, higher enrolment, shifts in the vocational and on-the-job training system, brain mobility and ageing teaching personnel, public funding crises, etc. - demonstrate opportunities as well as weaknesses of the recently reformed systems. The research area also is going through radical transformations, and with often weak resources and old fashioned institutions, confronts much criticism.

Although recent reforms have taken place in most of the countries, insufficient budget is spent on primary and secondary education in favour of high level education leading to worsening of quality and results in those initial levels. This is a serious problem as the cost may emerge only after years and it may take also lots of resources and also time to reverse such trend. Educational systems appear also to be increasingly underfinanced (as % GDP).

The deficiencies of the educational system are revealed by structural differences between skills supplied and demanded; lack of managerial skills, in particular to compete in global markets; and the lack of 'hot skills' (rapidly changing).

Investment in human capital and associated changes in its quality and structure are a long-term phenomenon and no significant fast changes are expected in this respect. The tentative conclusion is that while all countries are relatively better supplied with human capital than other ones at similar levels of economic development, the Central European and the Baltic states have the best starting position and may expect the most positive feedback from human capital on IS developments. But even in these countries the government should accomplish major investments and devote more public funding for education in order to maintain the competitive position of the countries in world ranking and also to adjust to recent changes in the composition of human capital.

Tomorrow's challenge to Education: The Growth / Demography squeeze

The economy of the 25 European Member States is expected to show positive growth rates in the next decade. Considering the Lisbon Objectives on one hand, the Convergence objectives on the other hand, average GDP growth rates of 2% per year for the 15 present Member States, and of 2% (low scenario), or 7% (high scenario) for the 10 new Member States are expectable. Such growth rates translate into economic structural changes across all Member States, with a general trend towards more services, less (and new) industries and less agriculture. Beyond those general trends, each country has its own "starting" profile: hence the speed and characteristics of the structural changes can be expected to be path dependent and thus country specific.

In particular, it is assumed that the New Member States show, as they did in the nineties, a more rapid and more specific structural evolution (because of the effects of transition and accession) than the 15 initial Member States which have reached a more stable configuration. Still, such (West / East) "differentiation" is not necessarily the only possible: it can be assumed that some structural transformations show similar patterns across EU25 such as for example (to be confirmed) those of Spain and Poland (large countries with solid agricultural basis), etc.

If one considers the "engine" of Growth being those structural changes, by analogy, the available workforce and its level of Education can be seen as the fuel for that engine. The present structural changes, both in Western as in Eastern Europe, need to be and are

accompanied by a progressive adaptation of the workforce in terms of skills. In particular it means that the move towards a Knowledge-based society - with its growing services sector and its higher share of added-value type of industries - necessitates a progressively growing share of tertiary educated workforce.

The educational systems in each of the 25 Member States do generate an evolving share of tertiary educated people, proportionally to the overall available youth in age of achieving tertiary level education in a given generation and in a given country. In particular in the New Member States, the enrolment figures for tertiary education have been rapidly growing during the nineties, due to large reforms of educational systems. Nevertheless, it seems that the overall share of tertiary educated people in those countries stands still below EU15 figures.

Finally, the demographic trends in all EU25 point at the more or less rapid emergence of an ageing - if not aged - society. In particular in the new Member States, this demographic trend seems to hit the countries a little later than the present Member States, but possibly in a stronger way.

Taking in account the above, it is expected that in several or all EU25 countries, the demographic pressure (reduced young cohort) will prohibit from meeting the needs for a skilled (tertiary level) workforce corresponding to high growth rates. This problem would be more acute in the New Member States because of the complementary impacts of higher rates of Growth, insufficient Education outputs and negative demographic trends.

The reform of Education, including aspects that today are external to the traditional educational field and institutions, seems to be the optimal solution to avoid the squeeze resulting from high growth rates and an ageing population. While differences among countries are significant, a deep reform in most countries is deemed necessary in order to maintain competencies and skills in human capital (and in particular ICT related fields), as well as the competitive advantages these bring.

While all countries have embarked on reforms within their educational systems, these reforms that far did not cover sufficiently the scope, the financing, the institutional and ownership structure of the education systems to meet the upcoming challenges of the Growth/Demography squeeze. Further, Education reform is at risk of being postponed in countries which face public finance problems and political instability, because of the social and economic costs of such reforms: this may feed negatively back to human capital, IS development and finally Growth.

Hence, investments in Education are still needed to adapt to the expected structural shifts. Educational reform need to put a higher emphasis on primary and secondary education, *and* avoid tomorrow's skills mismatch in Services and high added-value industries²⁴, by offering the relevant scope of educational options at tertiary level.

4. Conclusions

The ICT Unit of the IPTS²⁵ has taken as research objective to identify and understand Information Society strategies that would be supportive to the economic and social development towards the Lisbon objectives in an Enlarged Europe. This paper presents some of the global policy-oriented conclusions of this work, by focusing on one of its achievements: the identification of past and future determinants of Information Society developments in the thirteen Acceding and Candidate Countries (ACC13).

First, an analysis of both ICT production and ICT use in those countries, together with the assessment of national contextual factors, shows that six countries in spite of numerous differences can be assessed as more involved in both ICT usage and ICT production. These countries are Estonia, Malta, Slovenia, Hungary, Czech Republic and to a lesser extend Cyprus. In all cases, the process resembles rather one of catch-up than of leapfrogging, even if much has been written in related literature about the tremendous growth and potential of mobile telecommunications, about the excellence of the local skilled workforce as attractive factor for investment and entrepreneurship or about the importance of FDI flows to the emerging ICT industry. The European Enlargement cannot generate a radical change in Europe's position on the Information Society front: the ICT production capacity is proportionally too small in ACC13 as compared to the global world capacity, while, reversely, the ICT use patterns have caught-up sufficiently in ACC13 as to avoid any significant collapse of existing access and use figures across the newly Enlarged Europe.

Together, GDP growth, available revenues and resulting expenditure patterns explain – but only partly - the positioning of “better-off” countries in terms of impacts on ICT use. But the various indicators and qualitative observations clearly show that besides economic growth and level of income other factors have equally been important in the spread of ICT, both in use and in production. Additionally, no clear causal relationship or simple correlation can be

²⁴ The challenge of mobility is another answer to the local unavailability of a skilled workforce. But here, international agreements (Free movement) as well as national impediments (housing, labour regulation, ...) may show to be strongly constraining the opportunities.

drawn between the ICT usage and the ICT production sides: obviously ICT use necessitates a (domestic) supply side for equipment, maintenance and development of local services. Possibly also, the presence of an ICT industry influences positively on the use of such technologies through a variety of direct and indirect activities (skills upgrade, equipment, awareness rising, lobbying, etc.). Still the available research does not demonstrate any clear-cut relation and contradictory examples abound.

These observations point at the importance of better understanding the contextual factors and conditions influencing the IS developments. While economic growth and the level of economic development have, as expected, been strongly correlated with ICT spending, some countries show a different pattern in ICT use or production, due to other country-specific factors.

The following box introduces briefly to those 13 factors and offers a first approach of their organisation. They help to better understand the dynamics of development and the scope and role of public policies that can lead to (more or less) successful IS-related development, as they did in those countries since the mid 90ies.

The 13 determining Factors for IS-related developments in Europe

<u>EU25+ Common factors</u>	<u>ACC13 Specific factors</u>
<p><i>Economic factors</i></p> <p>1. Economic structural changes 2. FDI & other financing tools 3. Corporate Sector and ICT industry</p> <p><i>Political factors</i></p> <p>4. Committed and dialoguing IS policies 5. EU policies</p> <p><i>Cultural and Social factors</i></p> <p>6. Education 7. And other intangible assets</p>	<p><i>Economic factors</i></p> <p>8. Growth, Macro Economic Stability & Public Finances</p> <p><i>Political factors</i></p> <p>9. Regulation and related institutional settings</p> <p><i>Cultural and Social factors</i></p> <p>10. Consumption patterns</p>
<p><u>EU25+ Prospective factors towards 2010</u></p> <p>11. The threat of the new competitive pressure 12. Growing Social divides and the Information Society development 13. The Growth, Demography and Education squeeze</p>	

²⁵ Institute for Prospective Technological Studies, Directorate General Joint Research Centre, European Commission

Possibly, the most important political message lies in the last three factors: these seem to be emerging as new drivers, at the turn of the Millennium:

- Changing Competitiveness and the unpreparedness of Innovation Systems
- Growing Social Divides and the (relative) role of ICTs
- Squeezed (skilled) labour supply in the Knowledge-based Society and the role of Education

These three factors are expected to have a strong effect on future IS developments during the coming decade and possibly beyond. They are thus essential new challenges for research and for policy.

Additionally, while specifically identified by studies focusing on the New member States and on the remaining three Candidate countries, these factors are expected to impact Europe as a whole. All Member States are confronted to these three factors, possibly in various degrees -, and all will be impacted by the way those challenges will be addressed by the neighbouring countries. The interdependency of European nations is such that while identifying the specificities of a country's context, we have to acknowledge that in an Enlarged Europe, these specificities and the way they are addressed impacts on us all.

These three challenges are a strong invitation for striking the right balance between Growth and Social cohesion across an Enlarged Europe, and between short term quantitative objectives and longer term generational processes.

ANNEX 1: REFERENCES

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All those documents are or will be freely available on the “Foresight for Information Society Technologies in an Enlarged Europe” website: <http://fiste.jrc.es/>

ANNEX 2: LIST OF EXPERTS

International Expert workshop: “*Enlarging the European Information Society: Potential IS Strategies towards Lisbon 2010 objectives*”, organized by the IPTS, DG JRC, European Commission, Seville, 18-20th March 2004.

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