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Inclusion

Preparing Europe's digital future i2010 Mid-Term

i2010
A European Information Society
for growth and employment

European Commission
Information Society and Media

Preparing Europe's digital future i2010 Mid-Term Review

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European Commission
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Preparing Europe's digital future

i2010 Mid-Term Review

Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions

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European Commission
Information Society and Media

1 Introduction

Information and Communication Technologies (ICTs) continue to be a major driver of economic and social modernisation. Today, businesses in the EU devote 20% of investment to ICTs, and the sector accounts for 26% of overall research expenditure. Moreover, 60% of basic public services are now fully available online and more than half of EU citizens use the Internet regularly.[1]

> i2010 aims to 1) establish a European **information space**, i.e. a true single market for the digital economy so as to exploit fully the economies of scale offered by Europe's 500 million strong consumer market; 2) reinforce **innovation and investment in ICT research** given that ICTs are a principle driver of the economy; and 3) promote **inclusion, public services and quality of life,** i.e. extending the European values of inclusion and quality of life to the information society.

The i2010[2] strategy, launched on 1 June 2005, was the first coherent policy framework for the era of convergent telecommunication and media services. Much progress has been made in the past three years. A few examples suffice to show the breadth of achievements: a new regulatory framework for audiovisual media services is in place; proposals to reform the regulation of electronic communications have been launched;[3] regulation to create a single market for mobile phone use across borders is in operation; initiatives to boost online content in Europe are under discussion;[4] major new R&D and innovation funding initiatives are up and running (the Seventh Research Framework and the ICT Policy Support Programme under the Competitiveness and Innovation Programme — CIP); ground-breaking public private partnerships (Joint Technology Initiatives) have just been launched; and new eInclusion initiatives are on track.[5]

Meanwhile, Europe is among the world leaders in the development of the digital economy. The European broadband market, with 90 million lines, has more subscribers than any other economic region, and half of European citizens use the Internet on a regular basis. Some Member States top the world league in broadband take-up, mobile penetration, data traffic. But gaps between Member States are significant and Europe is under-investing when compared to other industrialised regions, as well as facing growing competition from China and India. That is why the policy framework provided by i2010 is needed more than ever today. But does the i2010 framework need adjusting mid-way through its term?

1 For all figures quoted, if not specified otherwise, see annexed staff working documents.
2 http://ec.europa.eu/i2010.
3 http://ec.europa.eu/information_society/policy/ecomm/tomorrow/index_en.htm.
4 COM(2007) 836, http://ec.europa.eu/avpolicy/other_actions/content_online/index_en.htm.
5 COM(2007) 694, http://ec.europa.eu/information_society/activities/einclusion/index_en.htm.

i2010 at mid-term

The current assessment of the Lisbon Strategy[6] shows that structural reforms are starting to pay off, but the economic landscape is fragmented. This overall picture is also true for the information society. While the 2007 Strategic Lisbon Report confirms the prominence of ICTs in structural reform and half of Member States have strengthened their R&D and ICT policies, many parts of the EU still lag behind in adopting ICTs.

During 2007, the Commission reviewed the i2010 approach in the light of today's priorities for growth and jobs. The assessment of the Lisbon strategy, the Single Market Review[7], the implementation of the Innovation Action Plan[8] and the review of the consumer *acquis*[9] have all highlighted the importance of ICTs. The following issues are thus becoming strategic for competitiveness and ICT take-up in Europe:

- Europe has made big progress towards the networked economy, but it needs to shift up a gear to lead the transition to next-generation networks while not slacking off in its efforts to overcome the digital divide.
- Europe should take better advantage of its number one economic asset, the largest consumer market in the developed world; however, despite the global spread of the Internet, further steps are needed to create a Single Market for the digital economy.
- ICT research expenditure is still below target in most Member States. Greater efforts are needed to pool resources by coordinating research and innovation efforts.
- As the Internet permeates daily life, public expectations and concerns about the information society are changing. Safeguards need to evolve to match technology and market developments, without stifling the huge opportunities that online social and economic activity offers.

This Communication makes concrete proposals for re-orienting i2010 to meet these challenges by further promoting competitiveness and ICT take-up in Europe.

6 COM(2007) 803, http://ec.europa.eu/growthandjobs/european-dimension/200712-annual-progress-report/index_en.htm.
7 COM(2007) 724, http://ec.europa.eu/internal_market/strategy/index_en.htm.
8 COM(2006) 502, http://ec.europa.eu/enterprise/innovation/index_en.htm.
9 http://ec.europa.eu/consumers/rights/cons_acquis_en.htm.

3 The challenge of future networks and the Internet

Digital convergence is now a reality and the Internet is an essential tool for our economies and daily lives. Broadband is becoming the standard mode of connectivity. Online content is developing fast, mainly in new and user-created content areas.

The European broadband market is developing rapidly and already outstrips that of the United States. The penetration rate reached 20% of the population in January 2008, a threefold increase since enlargement in 2004, with Denmark, Finland and The Netherlands being world leaders. However, there are now some signs of fatigue: growth in penetration is slowing down and there are increasing gaps between Member States in terms of take-up, speed, price and coverage. Bandwidth requirements are on the rise, and although speeds are developing similarly to those in the United States, the migration to high-speed broadband in the EU is sluggish.

High quality monitoring is crucial to the design of the appropriate policy framework. The Commission proposes to benchmark overall performance of Member States on a range of factors which could include current take-up, speeds, rural coverage, affordability, innovation and other socio-economic dimensions. The Commission will develop, in consultation with the Member States, a

Graph 1: **EU Broadband penetration rate (January 2008)**

Source: Commission services. Data for FR, NL, AT, EE and LT refer to October 2007.

Broadband Performance Index that will seek to compare broadband developments in the Member States.

Investment in next-generation networks is not going ahead as quickly as Europe needs. Consequently, the Commission will in 2008 clarify the regulatory provisions for next-generation access in a Recommendation. In addition to fixed-line infrastructure, wireless is increasingly emerging as an alternative infrastructure, especially but not only in rural areas. The Communication on the 'digital dividend'[10] has called for some frequencies to be made available to allow a balanced mix of high-definition broadcasting, mobile TV and wireless broadband.

With the Internet Protocol (IP) now the primary means of providing services, applications and content, a new more powerful version, IPv6, needs to be implemented. This will extend the available number of IP addresses considerably and allow more novel applications based on wireless technologies, which will expand broadband connectivity to include new mobile devices enabling ubiquitous usage. Radio-frequency identification devices (RFID) and sensor technologies embedded in products will generate much more machine-to-machine communication and extend the Internet to the 'Internet of Things'.

Taking a longer-term view, the Commission is preparing the ground for this future Internet of Things, for example through its work on RFID, Internet governance and network integrity[11]. In 2008, the Commission will issue a recommendation on RFID, to ensure legal certainty and ease privacy and security concerns. Furthermore, to bring together the various future-oriented actions and facilitate a coherent policy for preparing the information society for the future of the Internet, the Commission will issue a Communication on the future of networks and the Internet in 2008.

Actions in 2008:

- Develop a broadband performance index and invite Member States to set national targets for high-speed Internet usage to reach a 30% penetration rate among the EU population by 2010;
- Help prepare the information society for the future Internet economy by issuing a Communication on the future of networks and Internet;
- Facilitate the transition to new networks by issuing a recommendation on Next Generation Access;
- Promote the Internet of Things through a Recommendation on RFID, focusing on privacy and security issues;
- Propose measures to ensure a high level of resilience of critical communication networks and information infrastructure (like the Internet) and to guarantee continuity of services;
- Propose a set of actions to facilitate the transition to IPv6.

10 COM(2007) 700, http://ec.europa.eu/information_society/policy/radio_spectrum/index_en.htm.

11 See http://ec.europa.eu/information_society/policy/ecomm/tomorrow/index_en.htm.

4 Towards a true Single Market — the contribution of ICTs

Completing a single market for the information society and media is one of the main objectives of the i2010 initiative. Important steps have been taken recently with the adoption of the Commission's proposals for the reform of telecommunication rules and the launch of the Content Online initiative.

The EU regulatory framework has had a largely positive impact on European electronic communication markets, but has been unsuccessful in delivering sufficient consistency in regulatory approaches. The fragmentation of regulation across the 27 Member States, including the enforcement of remedies, threatens to become a serious obstacle to the development of the Single Market and to hinder the emergence of pan-European services.

In the reform of the regulatory framework for electronic communications[12], the Commission has made proposals to ensure greater consistency. It has proposed the creation of a 'European Electronic Communications Market Authority (EECMA)', which will draw on the expertise of national regulatory authorities. It will also facilitate a coordinated approach to spectrum across Member States. To reap the benefits of a single mobile market, facilitating the emergence of pan-European mobile services and the exploitation of economies of scale, the spectrum reform proposals promote more trading of spectrum within the EU as well as service and technological neutrality.

The Single Market review[13] underlines the potential of ICTs to open up the Single Market for the benefit of citizens, businesses and public authorities: the free movement of knowledge and innovation should be promoted as a 'fifth freedom' in the Single Market. The EU should improve the framework conditions for innovation, in particular in the information society, by accelerating the setting of interoperable standards and moving towards more common spectrum management. The Commission has been working on improving ICT standardisation and will come forward with a proposal by the end of 2008.

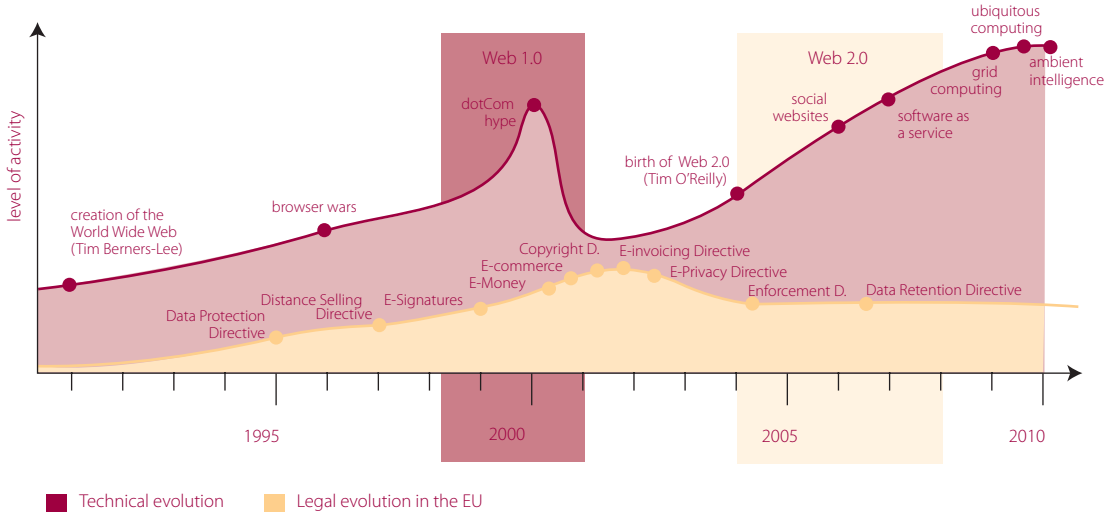
A clear priority for the EU is to close the important gaps in the Single Market, particularly in services, and this includes: streamlining of procedures, reduction of administrative burdens, and promoting transborder market access in particular for public procurement. Applications would include: interoperable provision of pan-European eGovernment services and the cross-border recognition of eSignatures.

The legal framework governing the information society and the sometimes fragmented implementation in the Member States can make it difficult to exploit the potential of ICTs on a European scale, risking increasing barriers to cross-border online trade. It is necessary to address overlapping requirements, gaps or inconsistencies in implementation and to keep pace with technological change (see graph 2 below) to ensure the efficient functioning of the "e-Internal Market". For example, eInvoicing will be addressed during 2008 and 2009 by an Expert Group that will identify regulatory shortcomings and eInvoicing business requirements, and will propose to the Commission by end-2009 a framework to promote full recognition of e-invoices in cross-border transactions.

12 http://ec.europa.eu/information_society/policy/ecomm/tomorrow/index_en.htm.

13 COM(2007) 724.

Graph 2: **Evolution of the legal and technical landscape**



Source: DLA Piper, 2007

Actions:

- Support the adoption of the regulatory package for e-Communications and in particular the creation of the EECMA;
- Make spectrum management more efficient by facilitating the harmonisation and trading of the pan-European part of frequencies;
- Develop pan-European public services, with the aid of the large-scale pilots under the ICT Policy Support Programme;
- Propose improvements to the EU's ICT standardisation system;
- Adopt an Action Plan to further promote eSignature and e-authentication;
- Implement the European electronic invoicing framework.

5 Facing the challenge of competitiveness through innovation and research

Research and innovation are at the top of the EU agenda for economic reform. But although 22 out of 27 Member States have identified these areas as key challenges in their national reform programmes and have foreseen over 14% of the Structural Fund investments in 2007-2013 for RTD and innovation, the target of 3% of GDP on research by 2010 is still out of reach.[14]

The EU spends only about half as much on ICT R&D as the US, and is specialised in sub-sectors with low research intensity. ICTs represent about 30% of the overall research effort in most developed countries, and the gap between the EU's efforts and those of its main competitors is undermining its future ability to lead information society innovations.

To stimulate an increase in investment, the EU has shown the way by making ICTs the single largest item within FP7. The EU is also pioneering public-private partnerships with the launch of the Joint Technology Initiatives ARTEMIS (embedded systems) and ENIAC (nanoelectronics). The Joint National Programmes are designed to leverage more R&D investment from both Member States and industry.

Financial support is complemented by a set of demand-side measures for innovation, such as the Lead Market Initiative[15]. The initiative focuses on high-potential markets in Europe and relies on a mix of R&D and innovation financing, public procurement of innovation, regulatory instruments, and coordination and partnership with Member States and stakeholders.

Procurement for innovation is underutilised in the EU. This includes in particular the procurement of R&D to bring about radical improvements in public services while at the same time creating opportunities for European companies to acquire international leadership in new markets and promoting consumer friendly standards.

eHealth Lead Market Initiative: An ageing society together with a dramatic increase in chronic diseases and an increasing demand for better healthcare will lead to an explosion of healthcare costs. ICTs play a key role in the transformation of healthcare systems and Europe has invested massively in R&D for healthcare applications. Forecasts expect an increase of 43% of the market volume by 2020, bringing it to €30 billion from currently €21 billion within the EU-15 in 2006. But eHealth systems in the Member States are not easily compatible. The eHealth Lead Market Initiative thus aims to develop a European market for innovative eHealth technologies and to combat fragmentation in the way healthcare is delivered in the different Member States.

The European Technology Platforms have helped bring about a more strategic and coordinated European research agenda and develop European, national and regional research and innovation programmes and policies, but there needs to be more cross-fertilisation among them.

eHealth is a good example of how ICT innovation can serve overarching European policy goals.[16] ICTs can

14 COM(2007) 803.

15 COM(2007) 860, http://ec.europa.eu/enterprise/leadmarket/leadmarket.htm.

16 COM(2007) 860.

also help achieve the EU's ambition to address climate change and increase energy efficiency. First of all, the ICT sector itself can 'get its own house in order' by improving energy efficiency at the level of components, systems and applications. For example, depending on the application, the energy-saving potential of data centres is between 20-70%. But more broadly, ICTs can improve energy efficiency across the economy through 'dematerialisation', enabling new business models, and through improved monitoring and finer control of processes and activities. As a first step, the Commission will focus on ICTs as an enabler to improve energy efficiency.

Following the evaluation of the Sixth Framework Programme[17], the Commission will in 2009 launch a set of initiatives to ensure Europe's leadership further developing ICTs, to modernise and improve the quality and efficiency of its public sector and to master the technologies essential for the economy and society. This process will be launched with a Communication on ICT research and innovation in 2009 and defining preparatory actions in FP7 and the CIP.

The contribution of ICTs to the Lisbon goals is further enhanced by the development of e-infrastructures (such as GEANT or Grids), which help build new research environments, driving productivity and the quality of the science performed. These infrastructures link researchers in all domains with huge bandwidth and computing power, removing geographical constraints and facilitating distributed collaboration, thus creating synergies between dispersed research groups and enhancing their potential to address more complex challenges.

Actions:

- Launch the Joint Technology Initiatives as the first true Europe-wide public-private research partnerships;
- Promote the European Technology Platforms, in particular closer cooperation among them;
- Implement the eHealth lead market initiative: eHealth innovation scorecards; Recommendation on eHealth interoperability; address standardisation and certification needs; measures to improve legal certainty;
- Promote the role of the public sector as a first buyer of innovation;
- Issue a Communication on ICTs and energy efficiency;
- Launch a process to ensure Europe's leadership in ICTs with a Communication on ICT Research and Innovation;
- Promote the role of e-Infrastructures in a changing and global research environment.

17 An independent panel chaired by Mr Esk Aho will issue its report mid-2008.

6 The need to develop a long-term policy agenda for users in the **digital environment**

The Internet is now part of daily life: in 2007 one in every two Europeans was a regular Internet user and nearly 80% of households using the Internet had already migrated from dial-up to broadband, with users increasingly embracing new applications.

Nevertheless, nearly 40% of Europeans do not use the Internet at all and 46% of European households still do not have Internet access.

The Commission is working step by step towards realising the ambition of making the information society accessible to all Europeans. The eInclusion initiative provides a strategic framework to boost the effective participation of groups at risk of exclusion and to improve the quality of life through the use of ICTs. The latter issue is also addressed in the i2010 flagship initiatives, such as the Intelligent car initiative, which have been developing into policy strands in their own rights.

The reform of the legal framework for electronic communications will strengthen user rights in the telecoms sector by making it easier to make informed choices before purchasing products and to switch providers. Access to emergency services through '112' will be improved and users with disabilities will benefit from greater access to services. Privacy and security provisions will also be strengthened. In addition, in line with its obligations, the Commission will report in 2008 on the application of the universal service obligations in the light of social, economic and technological developments.

eCommerce is not progressing as fast as other Internet domains. The complexity and diversity of products and services are making it more difficult for consumers to judge the quality of what is offered on the market, and a lack or perceived lack of trust and security when using new technologies and services could be hindering wider take-up. Clarifying users' rights and obligations is a first priority, which will be addressed in 2008. Raising trust and confidence in the online world is also crucial. The current review of EC consumer law will address these issues, in particular by harmonising and improving users' rights and obligations.[18] In this context, the Commission will make a proposal that aims at increasing confidence in cross-border transactions (including online transactions) by simplifying and improving the consumer regulatory framework.

The noticeable rise of online content, especially user-created content, is largely driven by new business models that increasingly rely on online advertising. The protection of copyright remains a constant concern for Member States and the Commission. The launch of the Content Online platform[19] will provide a forum to discuss these issues. On the issue of the disclosure of personal data for copyright protection, the Court of Justice[20] has highlighted the need to strike a balance between the fundamental rights of intellectual property and personal data protection.

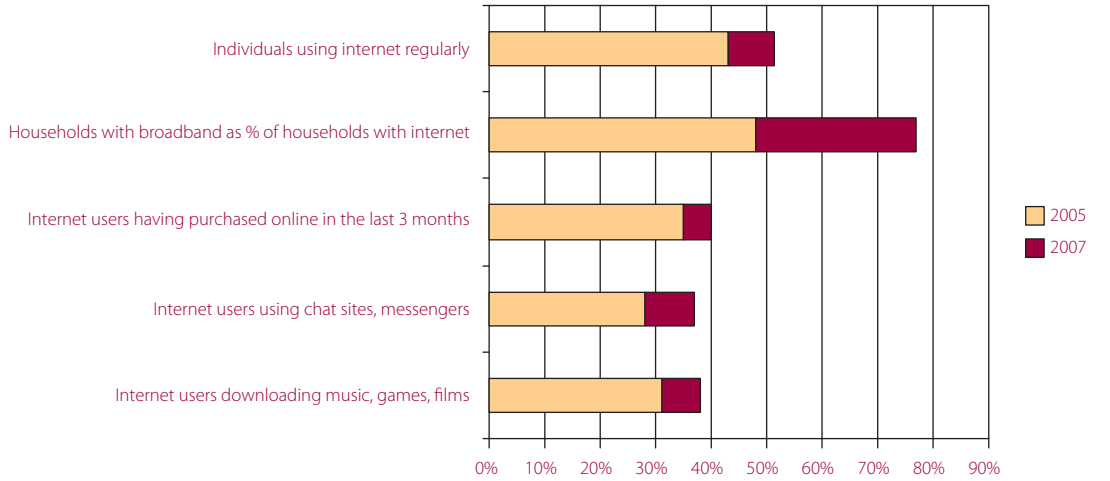
Social networking, or the participative web, is one of the growth phenomena of the past four years, becoming one of the most popular online applications for Europeans, after email and online search. In 2007, 24% of European citizens

18 COM(2006) 744, p. 1, http://ec.europa.eu/consumers/rights/cons_acquis_en.htm.

19 COM(2007) 724.

20 Case C-275/06.

Graph3: **Two years of rapid growth**



Source: Eurostat, data are EU27 averages

participated in online fora, up from 18% in 2006, with even stronger interest among the younger generations. The e-Participation initiative explores the Internet as a way of bringing political messages to the citizen. The rise of more participative ways of using the Internet leads to new challenges as well. A growing number of users are concerned about content quality, information accuracy, the integrity of information privacy and the protection of minors. Those starting to advertise and distribute content and to generate earnings from this through user-created content platforms are confronted with unauthorised use of their copyright-protected content. These challenges will be addressed further in 2008.

Actions:

- Report on the universal service obligations;
- Implement the eInclusion initiative: proposal on eAccessibility legislation; Ambient Assisted Living flagship to respond to the challenge of an ageing population; review of digital literacy policies; eInclusion summit;
- Publish a guide that explains users' rights and obligations in the digital environment;
- Launch the next phase in the review of the consumer *acquis* — Framework Directive on Consumer Contractual Rights;
- Launch Safer Internet 2009-2013 for the protection of minors and the fight against illegal content;
- Respond to the challenges to privacy and trust stemming from new converging services in the future ubiquitous information society;
- Launch the Content Online Platform;
- Address issues concerning the interoperability and transparency of digital rights management systems (DRMs) for consumers in the Recommendation on Content Online.

7 Conclusion

This Communication confirms the important contribution of information society and media policies to the achievement of the Lisbon goals. It also confirms the validity of i2010 as the reference framework for European information society and media policies. It makes concrete proposals for i2010 to be re-oriented to further promote competitiveness and ICT take-up in Europe. In 2008-2009 the Commission will also develop the long-term agenda for information society and media policies, and prepare an assessment of the overall contribution of ICTs to Europe's economic performance[21]. There is a crucial need to develop European policies that both encourage the competitiveness of the leading countries and address the gaps between the high and low performers, thus countering fragmentation among Member States.

21 Support for this will be drawn from ongoing analysis and consultations on the following topics: the economic and social impact of ICTs, including on employment; the legal and economic aspects of a Single Market for the information society; future policy needs for new networks and the Internet, privacy and trust issues in the ubiquitous information society; user-created content; a long-term reflection on the role of ICTs in sustainable development; and the development of an information society for all, including regional policies, http://ec.europa.eu/information_society/eeurope/i2010/studies/index_en.htm.

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European Commission
Information Society and Media

1 Introduction

The diffusion of ICTs continued to advance in 2006/2007, along with their contribution to economic activity. They are not only becoming increasingly pervasive but are also being constantly refined through innovative high-tech activities. This report monitors the evolution of the information society in the European Union by developing indicators, benchmarking the performance of individual countries and analysing markets.

Progress in 2006/2007 was against a background of improved economic performance. The strength of the economic recovery in Europe was greater than expected, with real GDP growth of 2.9% in the EU and 2.7% in the euro area, the highest growth rate since 2000, supported both by employment and labour productivity growth. Enhanced productivity growth was underpinned by multifactor productivity growth across the entire economy, possibly fuelled by the increased diffusion of ICTs. However, the expected economic downturn in the US, the financial turmoil and high oil and food prices are expected to slow down the growth of the European economy to 2% in the EU (1.8% in the euro area) in 2008 and hence to reduce investment in and take-up of ICTs.

Despite a general improvement in performance within the EU as a whole, progress differs across Member States and ICT development remains fragmented. This report takes a close look at differences between countries and warns that uneven developments may reduce the capacity of the single market to deliver benefits for the European information society and the broadband economy.

2 ICTs and economic activity

Previous editions of this annual report have discussed the impact of ICTs on labour productivity growth and identified three main channels:

- Technological progress in the production of ICT goods and services, which has made productivity growth faster in the **ICT sector** than in the rest of the economy.
- Declining prices for ICT goods and services, which stimulate **investment in ICTs** throughout the economy with immediate positive effects in terms of labour productivity growth. Since the mid-nineties, the distribution of capital has shifted from non-ICT investment to ICT investment in all major industrialised economies, although the shift in Europe has not been as pronounced as in the US[1].
- In the longer term, increased use of ICTs, accompanied by the reorganisation of business processes, which contributes to **efficiency gains** ('multifactor productivity growth') in the entire economy.

In the period 1996-2004, Europe witnessed an acceleration in productivity within the ICT-producing sector, and a deceleration in non-ICT sectors, though unlike in the US no acceleration was visible in ICT-using sectors. This is surprising as ICT prices are similar throughout the world. Some economists argue that the reorganisation of business processes takes time and that the impact will become visible in Europe at a later stage. Others point to structural problems of the European economy, such as more rigid labour and product markets.

New statistical evidence released in 2007, in the framework of the EU KLEMS project,[2] confirms previous analyses and provides additional insights at sector level and through international comparisons.

2.1. The ICT sector

ICT industries (manufacturing and services) represent around 5-6% of total GDP in the three main world economic areas (EU, US and Japan), but account for a much larger share of overall productivity growth thanks to rapid technological progress.

In the EU, the ICT sector prompted a 0.3% productivity growth over the period 2000-2004[3], driving about one fifth of the whole productivity increase. However, this contribution in the EU is lower than in the US (0.4%), both because the size of the ICT sector is smaller (5.3% of GDP in the EU as against 6.6% in the US) and because efficiency gains in the EU ICT sector were lower than in the US (5% as against 6.2%). The contribution of the ICT sector to overall productivity growth in Japan is similar to that in the EU: despite a larger weight in the total economy, productivity growth in the ICT sector was slower than in the US.

1 Evidence of these trends can be found in the 2006 edition of the i2010 annual report (p. 12).

2 http://www.euklems.net/. The EU KLEMS project is funded by the European Commission and aims to analyse productivity in the EU at industry level.

3 Source: Commission estimates based on the March 2007 release of the EU KLEMS database.

Table 1: **EU 27 IMPORTS AND EXPORTS ICT GOODS[6] (share of total imports/exports) to extra EU**

ICT goods	extra EU exports *	% on total goods exported	extra EU imports *	% on total goods imported	trade balance *
Telecommunications equipment	30,068	2.6	33,965	2.5	-3,897
Computer and related equipment	25,905	2.2	74,251	5.5	-48,346
Electronic components	30,685	2.6	44,652	3.3	-13,967
Audio and video equipment	6,020	0.5	26,972	2.0	-20,952
Other ICT goods	26,006	2.2	16,366	1.2	9,640
Total ICT goods	**118,685**	**10.2**	**196,206**	**14.4**	**-77,521**

*Source: Eurostat (COMEXT). * Data in millions of euros*

The efficiency of the European ICT sector is also reflected in the wages and salaries paid to ICT sector employees in the EU compared with the rest of the economy: €34,090 as against an overall figure of €19,887[4].

ICT goods account for a substantial share of total trade between the EU and its economic partners (Table 1). ICT goods represent 10.2% of all extra-EU exports of goods and 14.4% of all imports[5]. In particular, telecoms equipment and electronic components are the main sources of exports and computers the main source of imports. However, the overall trade performance of the EU in ICT goods is unsatisfactory. In 2006, it reported a €77.5 billion trade deficit, including €48.3 billion in computers, €20.9 billion in audio and video equipment and €14 billion in electronic components. The limited EU competitiveness in the ICT sector is linked to its lower capacity to innovate compared with other areas of the world.

2.2. Determinants of GDP growth and the role of ICTs

In the period 1995-2005, the US economy was the most dynamic of the three areas considered (EU, US and Japan), partly because of the contribution of ICT investment, but **mainly because of efficiency gains (multifactor productivity growth)**. US enterprises considerably improved their level of efficiency in the use of production inputs. In contrast, over the same period, **the average efficiency gains by EU enterprises were negligible**.

In most of the 10 EU Member States in Figure 1, in the period 1995-2005, the average contribution of multifactor productivity to economic growth was limited and even negative in the case of Italy, Spain and Denmark. Finland is the main exception with a strong acceleration of this contribution (from 1% in the period 1980-1995 to 2.6% between 1995 and 2005).

2.3. The sector dimension

The comparison of the relative performance of the EU[7], US and Japan, (Figures 2, 3, 4) reveals that:

- Electrical machinery plus post and communications (ELECOM), which account for a substantial share of the ICT industries (IT, communication manufacturing and telecom services), was by far the largest contributor to GDP growth in the three economic areas, though less so in the EU than in the US and Japan.

4 2005. Source: Eurostat.

5 COMEXT statistics 2006. ICT goods include: telecoms equipment, computers, electronic components, audio and video equipment, and other ICT products.

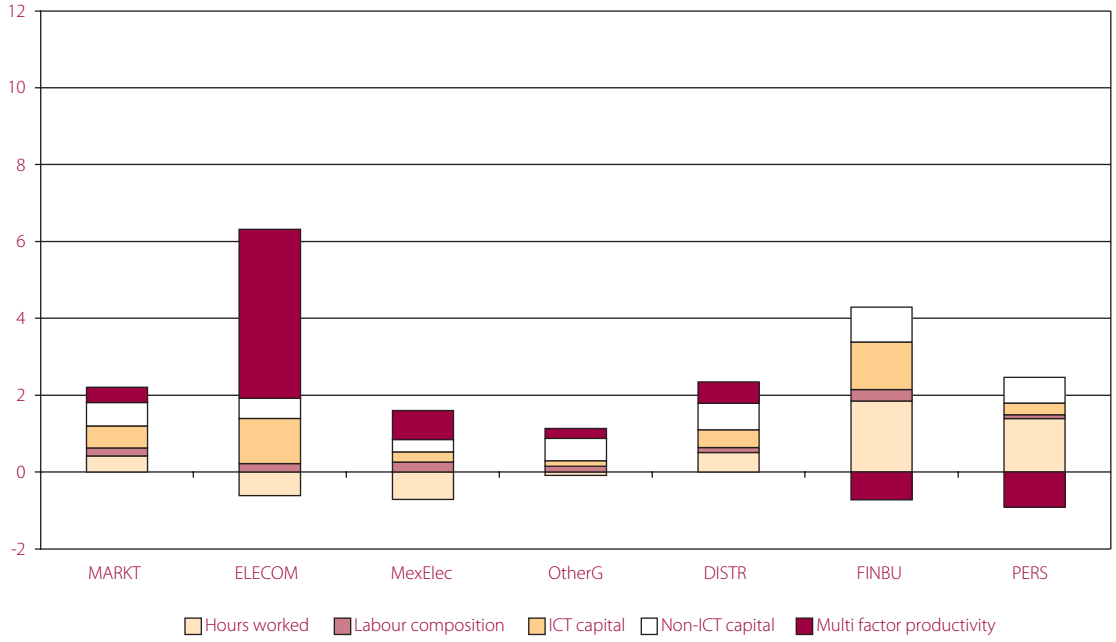
6 ICT goods categories based on OECD definition. Other ICT goods include office machinery and equipment, medical equipment, industrial process control equipment, and instruments and appliances for measuring, checking, testing and navigating.

7 Figure 2 covers only 10 EU Member States. However their GDP represents 86% of the EU GDP (2007).

Figure 1: **Contributions to GDP growth (market economy), 1995-2005 (in %) in 10 EU Member States**

Source: EU KLEMS database, November 2007

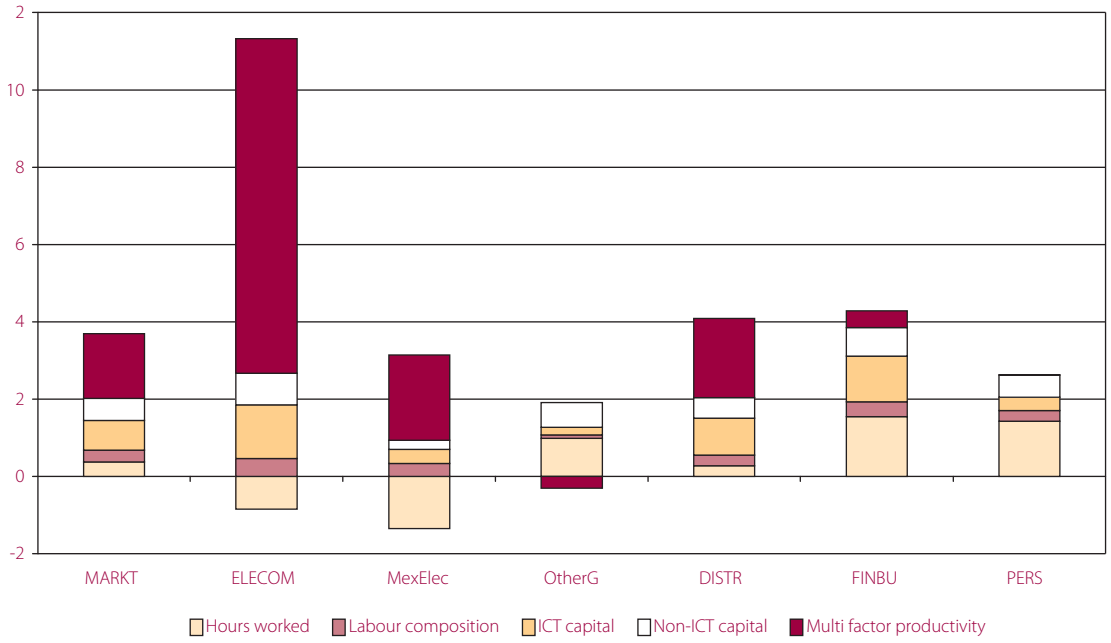
Figure 2: **Contributions to GDP growth (market economy), 1995-2005 (in %), in 10 EU MS**



Source: EU KLEMS database, November 2007. MKT = Market Economy. Elecom = Electrical machinery, post and communication. Elecom = Electrical machinery, post and communication. Other G = Other goods producing industries. Distr = Distribution services. Fin Bu = Finance and business services. Pers = Personal and social services. 10 EU MS: BE, DE, DK, ES, FR, IT, NL, AT, FI, UK.

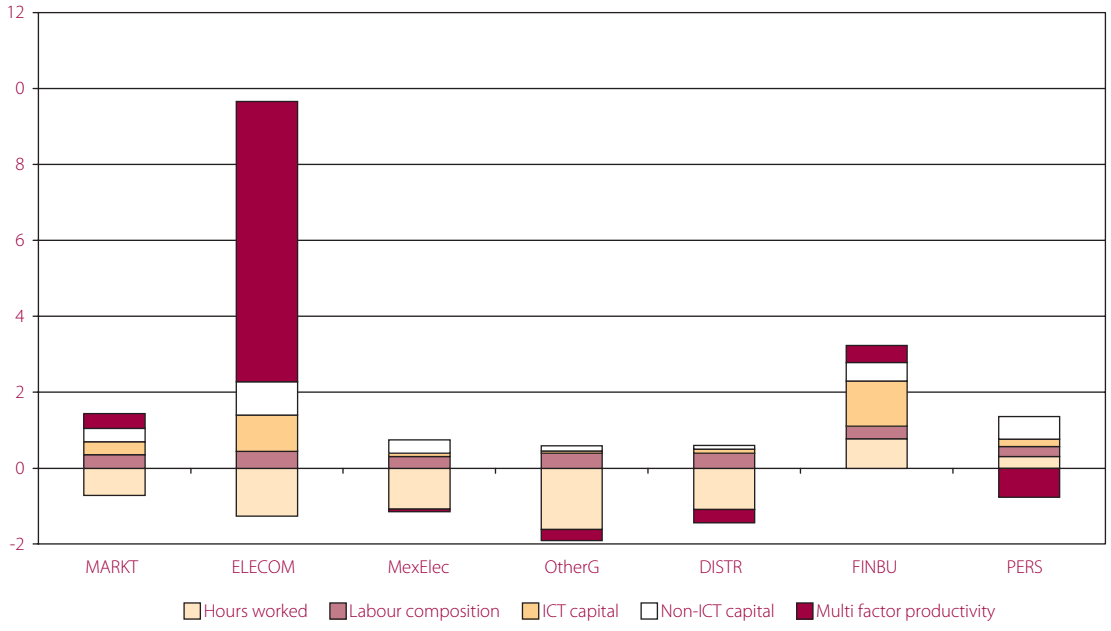
- **All the remaining service sectors** (financial, business, personal, social and distribution) **in the US outperformed their European counterparts in terms of contribution to GDP growth** (Figures 2 and 3), mainly because of a significant improvement in the efficiency of their business processes. This is probably

Figure 3: **Contributions to GDP growth (market economy), 1995-2005 (in %), US**



Source: EU KLEMS database, November 2007

Figure 4: **Contributions to GDP growth (market economy), 1995-2004 (in %), JP**



Source: EU KLEMS database, March 2007

linked to the superior capacity of US businesses to adapt their organisation and make the best possible use of new technologies. Further analysis suggests that the source of this divergence may be related to ICT adoption by service industries. The use of ICTs delivers efficiency gains through the automation and seamless integration of different processes along the whole value chain, provided that organisations are prepared to innovate the way their business is conducted. For distribution services, in particular, the

case of Wal-Mart has often been cited as an example of the successful implementation of innovative business processes mostly based on the use of ICTs.

- The Japanese economy had the lowest GDP growth among the three economic areas and posted a fairly flat performance in the majority of economic sectors, with the exception of electric machinery, post and telecommunication, business and financial services (Figure 4).

2.4. Additional insight from micro-level analysis

Macro-level analysis points to efficiency gains in the use of production inputs as the factor explaining the difference in economic growth between the US and the EU in the period 1995-2005. This suggests that increases in ICT investment do not guarantee stronger multifactor productivity growth. General framework conditions, such as the degree of competition in a market, are likely to be of fundamental importance for the innovative capacity of an economy. Statistical evidence suggests that the main role of ICTs as a contributor to productivity growth is their capacity to enable improvements in the way business processes are organised. Several studies based on empirical evidence at enterprise level seem to confirm this hypothesis. In particular, a 2007 analysis based on econometric modelling of enterprise-level panel data for the period 1998-2000[8] looked at the relationship between productivity growth, ICT investment and organisational change for the UK:

- ICT investment generates significant productivity gains when its implementation is accompanied by the restructuring of business processes and changes in enterprise organisation.
- The changes necessary to secure the return on ICT investment tend to emerge only after some time, while there could be short term negative effects due to the fact that implementing these changes calls for some human resources to be temporarily diverted from direct production.
- The general economic environment and in particular competitive market pressures are crucial in determining the propensity of businesses to innovate their organisation and business processes. Cultural factors and management styles could also play a role: evidence shows that US-owned multinationals in the UK undertake more organisational change than UK-owned companies, all other things being equal.

2.5. Conclusions

ICT production and diffusion in the economy have proved beneficial to innovation, productivity growth and economic development to an extent linked to the capacity of different economies to reap the benefits from ICT investment. Europe has been able to benefit from ICTs only recently and its capacity to reap future benefits may be constrained if investment and consumer spending fall in 2008 as a consequence of an economic slowdown. However, Europe is far below saturation levels in most information society indicators. Furthermore, continued innovation in, for example, wireless technologies and machine-to-machine communications are promising avenues for further productivity gains.

8 Crespi, G. et al. (2007), Information Technology, Organisational Change and Productivity — Centre for Economic Policy Research, Discussion Paper No 6105.

3 Single information space

3.1. Market developments

The telecoms sector

The telecoms sector is the biggest single component of the ICT sector, representing about 44% of its market value[9] and 2% of GDP[10]. In 2007, the telecommunication services market was estimated at roughly €300 billion with nominal growth slowing down to 1.9%[11]. Thanks to declining prices, however, the real growth of the telecoms market is up to 3% with the sector remaining dynamic and driving around 12% of overall labour productivity growth[12].

The telecoms market in the EU is characterised by declining revenues in the fixed voice sector, driven by increasing competition, falling prices and substitution by mobile voice services. In the mobile sector, which now generates around 50% of total revenues, voice services are starting to show signs of flattening out, whereas the share of mobile data services is increasing and expected to grow by around 8% in 2007. However, data only represent 17%[13] of total mobile revenues. Fixed broadband services experienced the highest growth in the sector, with around 14% in 2007. While this rate is still strong relative to the other segments of the telecoms sector, the average revenue per user (ARPU) is expected to decline in 2007 due to levelling off in the growth of broadband lines and the fall in prices.

Market developments differ across the EU Member States. The overall positive figures for the EU are partly due to growth in the new Member States, where the possibilities for organic growth are higher than in the mature markets of the old Member States. In the latter countries, the decline in average revenue per user in the mobile voice segment is not yet offset by growth in the market for value-added services through high-speed mobile networks (3G), despite the extended coverage and improved transmission capabilities of advanced mobile networks.

Leading EU operators are reacting to the slowdown in the European electronic communications market by following different strategic paths. These strategies can be summarised as follows:

(i) **Investment in non-domestic developing markets**. Revenues generated in developing markets represent an increasing share of total revenues and currently more than offset the decline in home markets. The large European operators have expanded their footprint and made a number of acquisitions in recent years.

9 EITO, 2007.
10 Estimate based on Eurostat figures.
11 EITO, 2007 Update.
12 Estimate based on EU KLEMS.
13 EITO, 2007 Update.

(ii) **Cost-cutting, including through deployment of next-generation networks and sourcing initiatives**. Investment in high-speed networks is driven by the need to reduce operating costs and open new markets based on IP multimedia subsystems. Linked to this is the addition of new activities such as corporate IT services based on IP networks and a further concentration on specific corporate needs. Major operators have also divested other businesses not considered part of their core activities.

(iii) **Development of innovative business models**, including bundling of services, fixed-mobile convergence, more sophisticated user-tailored approaches, and marketing of value-added services. Growth is expected to come from the addition of new services to existing customers.

Software and IT services

Software and IT services represent about one third of the entire ICT market and are its most dynamic component (Table 2). The main growth drivers for this segment are storage, security and business management software.

Table 2: **EU market * growth rates**

	2006/2007	2007/2008
Software	5.9%	5.7%
IT services	6.7%	6.4%

*Source: EITO autumn edition 2007. * EU without Malta and Cyprus*

According to a forecast by a leading market analyst, software and IT services are expected to continue growing strongly for the next three years, with the EU and US markets experiencing similar trends (Table 3):

Table 3

	Software CAGR 2006-2011	IT services CAGR 2006-2011
Europe*	7.8%	7.2%
USA	7.9%	7.2%
Japan	4.8%	3.6%

*Source: Gartner Dataquest Market Databook, September 2007 Update; CAGR = compound annual growth rate.*Europe in its geographical sense, not just limited to the EU.*

The Internet is changing business models in the software market. Service and service-oriented software, e.g. **SaaS** (**Software as a Service**) and **SOA** (**Service Oriented Architecture**), is now a significant driver of growth. Enterprise software for content, collaboration and communication based on the Internet, which can be used for both intra and inter-organisational communication, is expected to see a worldwide growth rate of 13.9% in 2006-2011[14]. In the same way that users are playing a greater role in online content through web 2.0 applications, enterprises are using these applications to obtain direct input from employees. Enterprise 2.0, the business equivalent of web 2.0, may be about to follow the rapid rise of social networking sites.

In 2007 and 2008, SMEs are expected to increase investment in software for hosted services deployed over the Internet (SaaS — software as a service). This software does not require great investment, as it can simply be rented when needed as a hosted service and hence offers a particularly convenient business model. This development promises to enhance the ability of SMEs to exploit ICT benefits in the near future.

Furthermore, integration platforms are becoming increasingly SOA oriented which can integrate standard software with different kinds of applications. Despite currently low market volumes, SOA has the potential to become a significant growth driver. The emergence of the 'Internet of Things', connecting a multitude of devices such as PDAs, RFID tags, cars, etc., may also increase demand for SOA-based services.

Open source software is also expected to increase its contribution to the dynamics of the software market. Market spending on open source products does not adequately reflect their use, since business models based on open source software mostly do not rely on the sale of software licenses. Instead, open source production often contributes to generating other streams of revenues, e.g. service-based revenues, especially in secondary markets (e.g. financial sector, electronic equipment). Indirectly though, price competition is stimulating the adoption of open source solutions and reducing the growth in system infrastructure and tools software[15]. According to a 2006 study[16] for the European Commission, open source will have a significant impact on the European economy.

14 Source: Gartner Dataquest Market Databook, September 2007 Update.

15 EITO Update 2007.

16 Study "Economic impact of open source software on innovation and the competitiveness of the Information and Communication Technologies (ICT) sector in the EU", November 2006, UNU-MERIT, the Netherlands.

Figure 5: **Importance for Customers' Business**

Source: McKinsey & Company and Sand Hill Group, 2007

Defined broadly, open source-based services could reach a 32% share of all IT services by 2010, and the open source share of the economy could rise to 4% of European GDP by 2010. Open source is already directly behind 29% of the software developed in-house in the EU (43% in the US) and provides the natural model for software development for the secondary software sector. The strong open-source community of active developers, small firms and the secondary software industry in the EU are a strength for the European ICT sector. However, this contrasts with Europe's generally low level of ICT investment and the low rate of open source adoption by large industry compared to the US.

The software market is setting a trend where ICTs — in the form of software services — are becoming more pervasive thanks to the Internet infrastructure. This ubiquitous development is confirmed by a recent survey[17] of IT professionals and chief information officers (CIOs), who cited web services/SOA and open source as the most important areas for their customers in terms of software services (Figure 5).

3.2. The broadband economy

The European Commission has been closely monitoring developments in the broadband market, both from a regulatory and a policy point of view, using a number of indicators that address various market features. These include broadband take-up, coverage, competition, speeds, prices and usage. While broadband penetration has traditionally been used as the main benchmark for setting broadband objectives, market developments suggest that there is an increasing need to look at other variables as well. Countries with similar penetration rates may follow different development patterns resulting in significant differences with regard to both supply and demand. This section looks at a number of developments in the broadband market in 2007 and concludes by highlighting the need of proposing a composite index to provide a broad perspective and facilitate benchmarking.

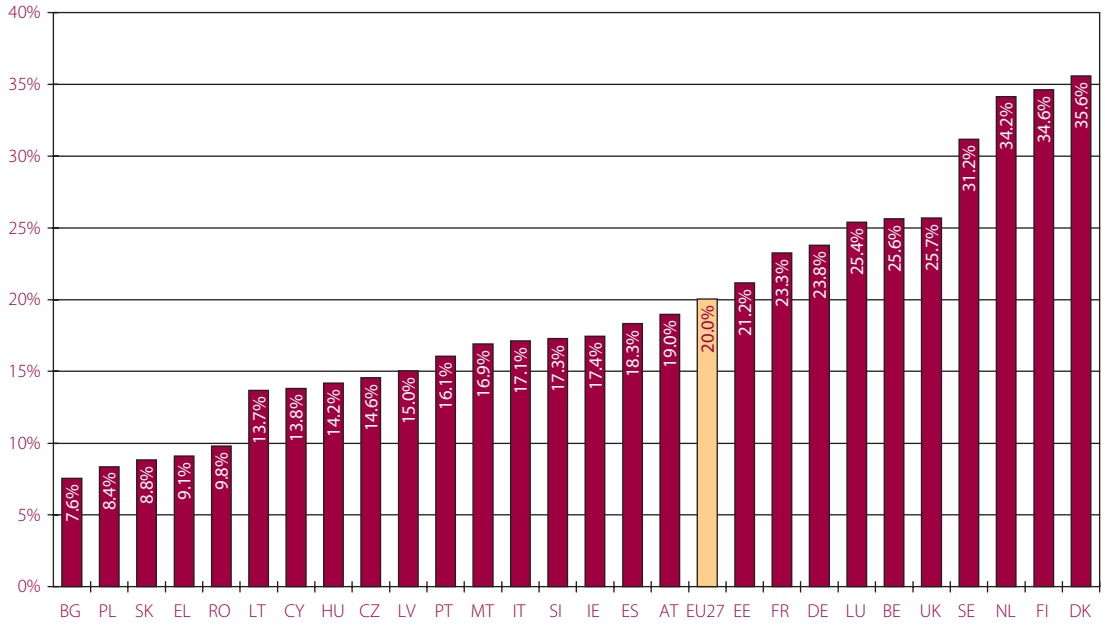
Penetration rates

Growth in broadband penetration continued in 2007 but large gaps remain between countries. In January 2008, there were an estimated total of 99 million broadband lines in the EU, an increase of 23.8% over the preceding year. This represents an average broadband take-up of 20% of the EU population (Figure 6). Denmark, Finland, the Netherlands and Sweden top the EU league with penetration rates above 30%, and maintain their position as world leaders well ahead of Korea, the US or Japan.

Time series data indicate that the difference between the most and the least developed countries in terms of broadband penetration is widening. The gap increased from 8.5 percentage points in 2003 to 18.7 points in 2005 and 28 points in 2008 at EU level (Figure 7).

17 The Enterprise Software Customer Survey 2007 from McKinsey & Company and Sand Hill Group examined the strategies of 475 senior IT and business executives.

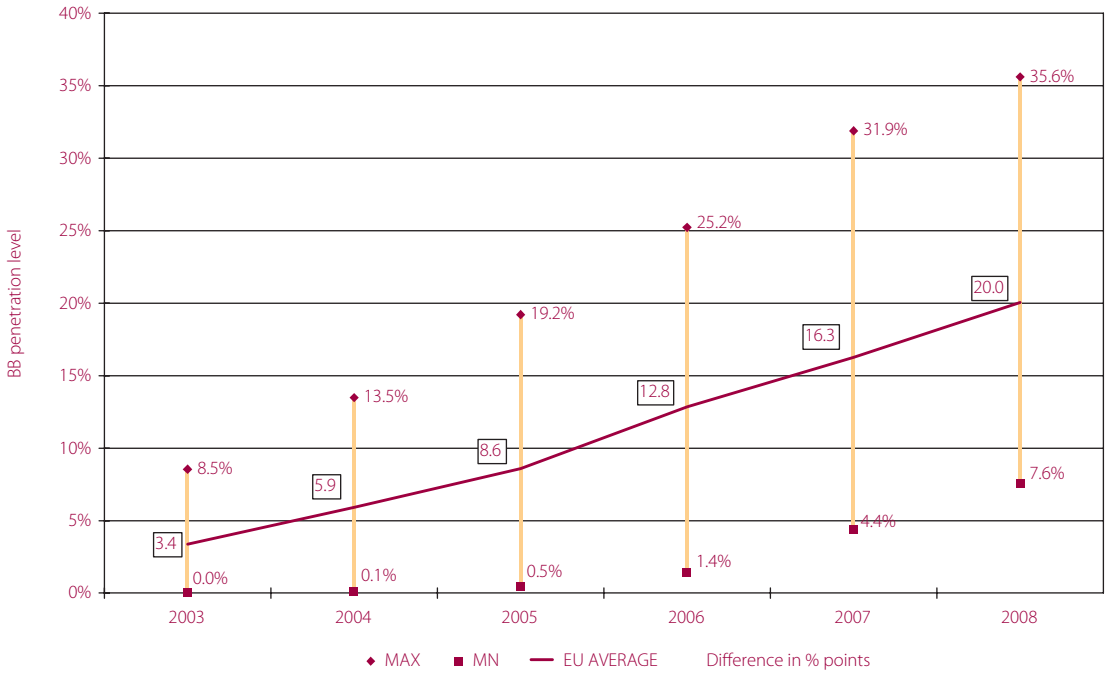
Figure 6: **EU Broadband penetration rate (January 2008)**



Data for FR, NL, AT, EE and LT refer to October 2007

Source: EC services based on COCOM data

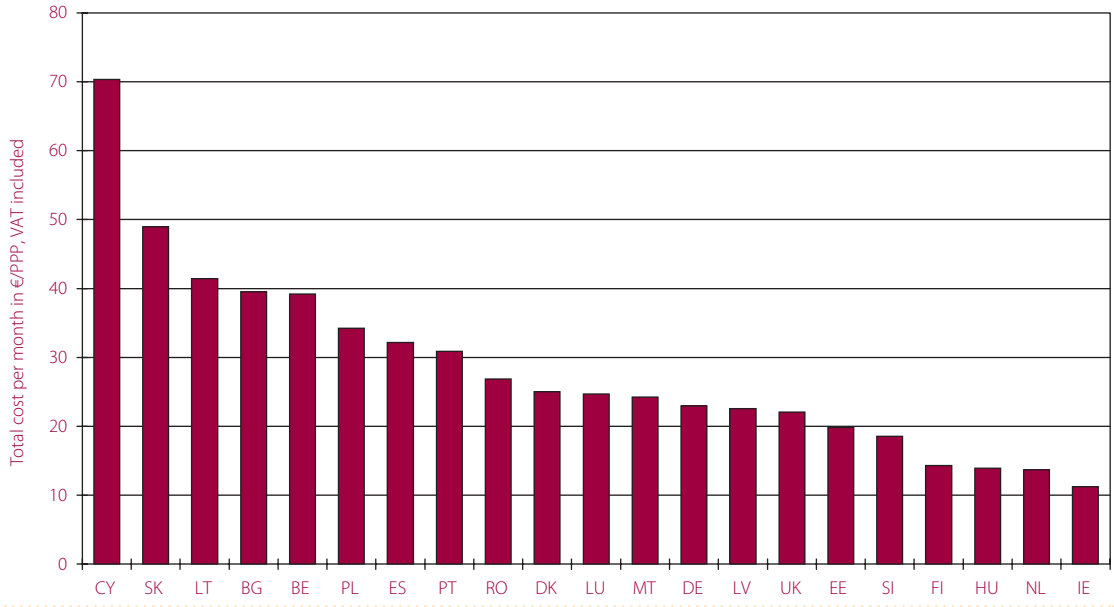
Figure 7: **The gap in broadband penetration in the EU**



Source: EC services based on COCOM data

Another significant development in 2007 was that, for the first time in the last five years, the year-on-year increase in the number of new lines declined at EU level, from 21.1 million new lines in 2007 to 19.1 million in 2008. The decreasing growth in more developed broadband markets is not being fully offset by growth in developing markets. However, these figures refer to fixed access broadband lines only. In a number of Member States, wireless broadband technologies

Figure 8: **Least expensive offer for a 1 Mbps access line, April 2007**



Source: EC services based on data from Van Dijk[20]

have made significant inroads and such developments will be taken into account in future analysis[18].

Prices

Gaps in penetration rates and different stages of market development are also reflected in price differences. In more developed broadband markets, operators have been introducing new services and bundled products, pricing policies with attractive discounts, or upgrading download and/or upload speeds at low or no extra cost. In developing markets, however, operators can still add new subscribers and have less need for making innovative offerings. Prices for similar products tend to be higher in countries with lower broadband take-up. For instance, the least expensive offer for broadband access with a nominal download speed of 1 Mbps was priced at €49 in Slovakia, while consumers in the Netherlands were charged €14 for a product with similar speeds (Figure 8)[19].

The price comparison[21] conveys a picture of fragmented markets:

- There are still significant differences between Member States in retail prices for similar products.
- On average, when all speed brackets are considered, broadband access costs tend to be higher in the new Member States than in the EU15, with the exception of Latvia.
- There is an inverse, although not very strong, relation between broadband penetration and broadband prices, i.e. countries with higher broadband penetration tend to have lower prices (Figure 9). Other factors besides prices (coverage, choice, availability, quality of service, PC penetration, income, education and other socio-economic factors) are also important in encouraging broadband penetration.
- Although broadband access is still offered as a separate product, the bundling of products (broadband access and telephony and/or television) is becoming more common in a number of countries. The percentage of households that purchase combined packages offering more than one communication service is higher in countries with

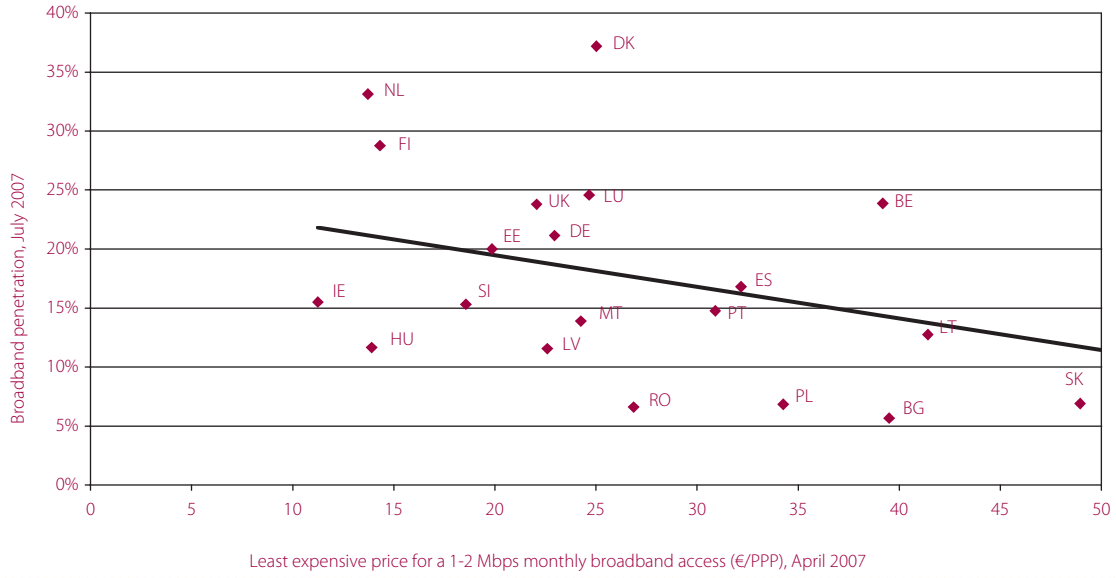
18 The Communications Committee has adopted a new methodology for data gathering which will include data on mobile broadband access.

19 Comparisons are based on purchasing power parities to eliminate differences in price level.

20 Study: "Broadband Internet Access Costs", Van Dijk – Management Consultants, (forthcoming).

21 The price analysis was conducted for various speed brackets and led to very similar conclusions.

Figure 9: **Correlation broadband price/broadband penetration EU27**



Source: EC services based on data from COCOM and Van Dijk.
EL, CY: out of scale. Data on prices for AT, CZ, IT, FR and SE not available.

high broadband penetration rates, with the exceptions of Finland and Italy. On average, one in every five households has subscribed to a bundled offer.

Coverage

Broadband coverage has rapidly grown in the last three years, but gaps between countries remain together with gaps between urban and rural areas.

DSL networks, which 80% of EU broadband subscribers use for fast Internet access, are good proxies for broadband coverage. Cable modem networks are concentrated in more densely populated areas and their availability is limited compared to the widespread presence of public telephone networks. Other alternative technologies, whether wired or wireless, are still marginal in several Member States.

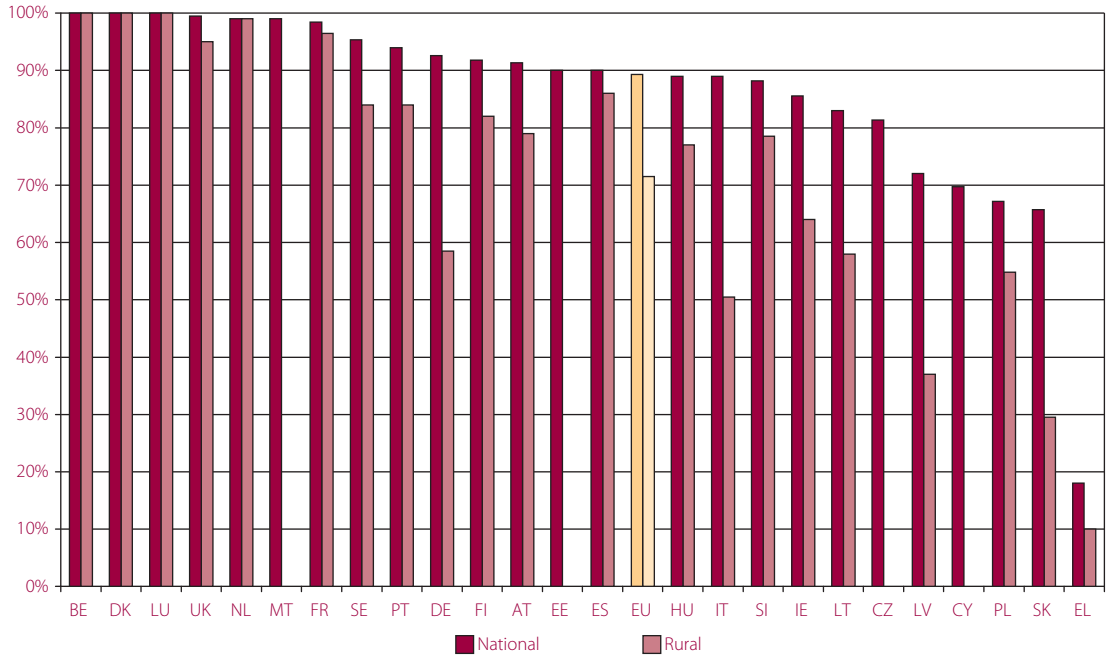
At the end of 2006, the average (EU25) level of coverage of DSL networks was 89%, i.e. telephone switches serving 89% of the European population had been equipped with DSL technology (Figure 10).[22]

Differences in coverage between Member States persist, and a number of countries — Greece, Slovakia, Poland, Cyprus and Latvia — still have some way to go before achieving full coverage. Progress in extending DSL coverage has been good in some of these countries but not very promising in others.

Figures for the national coverage of DSL networks also hide a gap between rural and urban areas in several countries. Deployment costs largely depend on a country's topography and population density, and full coverage remains a challenge in a number of countries. Greece, Slovakia, Latvia, Italy, Poland, Lithuania and Germany show a large gap between coverage in urban and rural areas. On average, at EU25 level, 94% of the population in urban areas are able to subscribe to a DSL connection, as against 72% of the rural population.

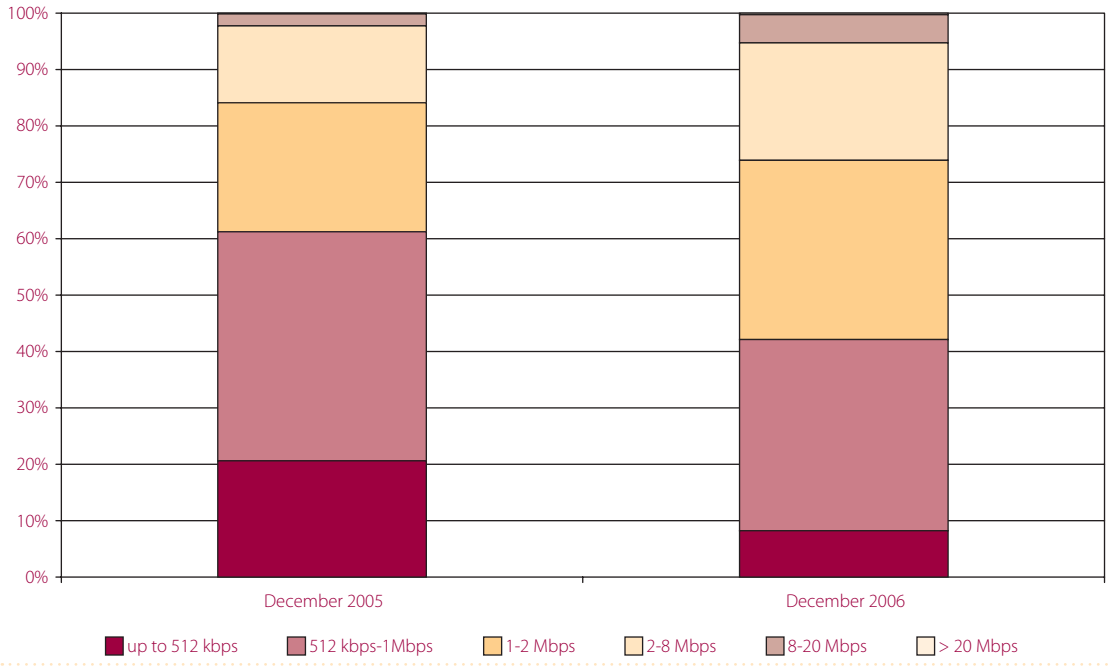
22 The limited reach of xDSL technologies means that availability and choice of service depend on the distance between the local switch and the subscriber's premises, so the figure for eligibility, i.e. the proportion of the population that could effectively opt for a DSL connection, is less than 89%.

Figure 10: **Coverage of DSL networks as % of population, December 2006**



Source: Idate, "Broadband Coverage in Europe" 2007[23]

Figure 11: **Subscribers by download rates in the EU (DSL and cable modem)**



Source: EC services based on data from Idate[24]

23 Available at http://ec.europa.eu/information_society/eeurope/i2010/docs/benchmarking/broadband_coverage_10_2007.pdf

24 op. cit. footnote 23.

Speeds

The average rate of download speeds that European citizens subscribe to are slow compared to other regions. Average EU speeds are about 1 Mbps[25] with limited upload speeds. For the EU as a whole, the percentage of subscribers to cable modem and xDSL products with speeds below 1 Mbps is declining, while the percentage of subscribers with access to speeds between 1 and 2 Mbps has risen from 23% to 32%. Nevertheless, the 512 Kbps to 1 Mbps range remains the most common (34% of subscribers), closely followed by the 1–2 Mbps bracket. Only a small fraction of European subscribers have broadband speeds above 2 Mbps, and access speeds above 8 Mbps are still marginal (5% of cable modem and DSL subscribers) (Figure 11).

Fast connections such as fibre are used by only 1.2% of European subscribers concentrated in a handful of countries. The picture is similar to developments in the United States, but in Japan there are more fibre users than ADSL subscribers, and in Korea 30% of users subscribe to fibre-to-the-home. The increasing importance of user-created content points to a need to improve upload speeds and move towards symmetric high-speed solutions. In some countries, demand for bandwidth is already stimulating the development of fixed-access networks that bring fibre closer to end users and increase capacity.

Several announcements of investment in high-speed networks are being made across European countries. Various solutions are being envisaged that include both pure fibre-to-the-home/building models as well as fibre-to-the-node. High-speed access networks will enable the transmission of bandwidth-hungry content and services, from multimedia entertainment to interactive commercial and public personal services and bring improved upload speeds.

Competition

Market competition remains one of the main drivers of broadband adoption. As the number of broadband lines in the EU has risen eleven times from almost 9 million in July 2002 to 99 million in January 2008, the market share of non-incumbent operators in the retail market has increased from 37% to 54%.

Countries with alternative platforms (cable and DSL) were the first to benefit from competition as cable operators started offering broadband and telephony services on top of their traditional broadcasting services. In parallel, the effective application of sector regulation has been instrumental in increasing opportunities for alternative operators in the broadband market, especially in countries where platforms other than DSL do not exist. A more recent development is the increasing growth in broadband access using other less traditional technologies (fibre, wireless local access), especially in the last two years.

In January 2008, DSL lines represented 80% of the overall market, but after four years of continuous growth, this rate is declining and other technologies are increasing their market share. The EU average hides significant differences between Member States: while DSL represents 84% of all lines in EU15 countries, cable and other technologies dominate with 51% of the market in the Member States that joined the European Union more recently.

In the DSL market, regulation has enabled alternative operators to access the network of the incumbent operator. The increase in competition within this segment has been remarkable: while incumbents in 2002 controlled 87% of DSL lines, this share has declined to 56%. In addition to the entry of new operators, the nature of competition is also changing with many countries experiencing a gradual move from service-based competition to infrastructure-based competition using local loop unbundling (LLU).

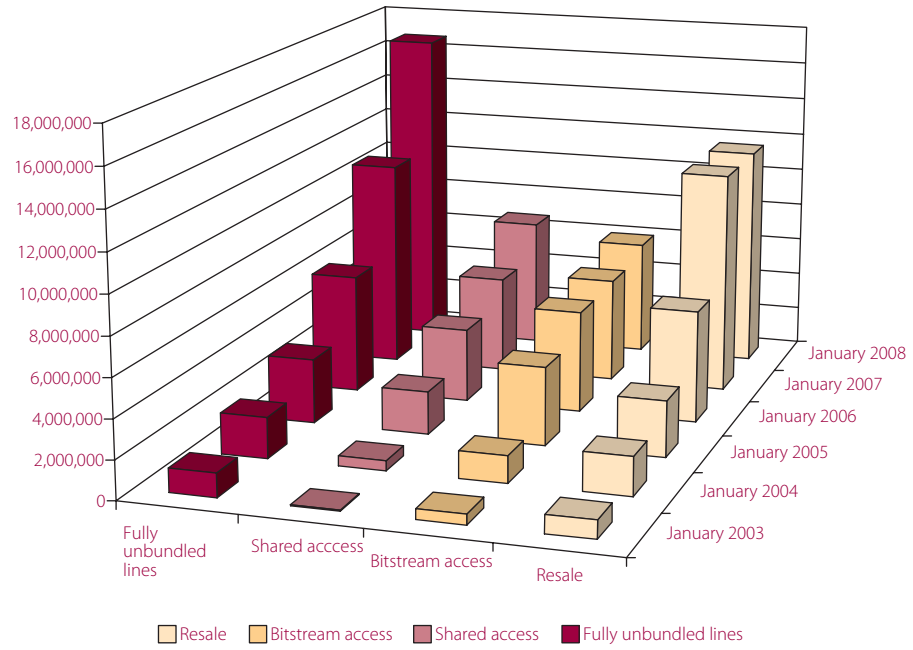
Progress in the strengthening of effective competition is visible as LLU increases its relative share (Figure 12).

In January 2008, LLU (fully unbundled lines and shared access) accounted for 12.8% of active PSTN (public switched telephone network) lines in the EU. Fully unbundled lines grew by 54% over the year, shared access by 34%, bitstream by 10% and resale remained stable. These figures confirm the steady growth in LLU, together with flat growth in resale and a recovery for bitstream after almost flat growth in 2006.

The overall progress of competition is good, but significant differences persist between Member States. While some disparities reflect different stages of development of

25 Data as of December 2006. Several operators have increased advertised speeds since then.

Figure 12: **Availability of wholesale access in the EU**



Source: EC services based on data from COCOM

national markets, it appears that markets with comparable penetration rates might be following different underlying competition models. The correlation between platform competition and broadband penetration decreased in 2007, suggesting that other aspects, including socio-economic factors, may have increasing importance in explaining different developments in broadband markets.

Usage

Gaps in broadband development correlate with differences in terms of usage, with advanced services being increasingly adopted in more developed markets. There is a strong relation between broadband penetration and the use of Internet services. For instance, around 80% of individuals in countries with high broadband take-up access the Internet regularly, as against the EU average of 51% and 10% in countries with lower broadband penetration. In the latter, the percentage of households connected to the Internet but without broadband access is still very high — up to 70% in Greece or 64% in Romania.

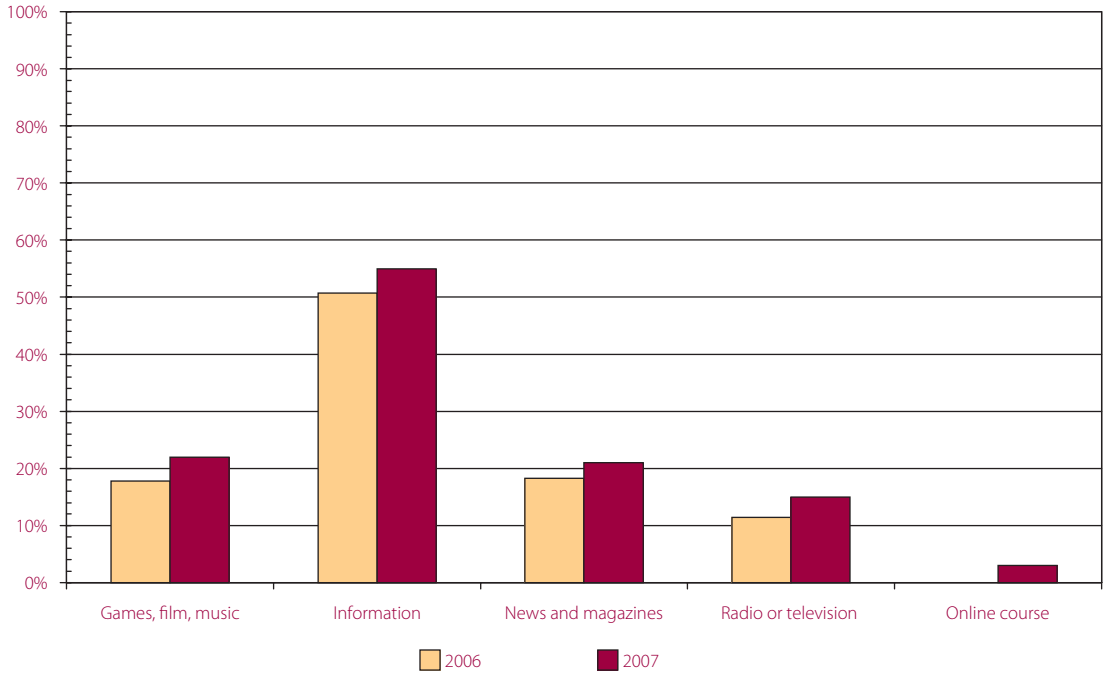
The chief reason given for not using broadband is the perception that fast Internet access is not needed. Other main reasons are the lack of broadband availability and excessively high prices. These perceptions hold true both in more and less developed markets.

Differences in the usage of simple services such as e-mail are not large but this is the case for advanced services such as the downloading of games, music and movies, IPTV or web radio which require minimum speeds. In some Member States, these are either not yet affordable or worst not available to many consumers, and this results in increasing usage gaps.

Indicators of broadband performance

Many factors impact on the take-up of broadband services in the European Union and result in gaps between Member States. Differences are visible not only in terms of penetration rates but also of coverage, speeds, prices and level of usage. National markets with comparable penetration rates can show significant differences in broadband prices or speeds. The result is that the overall broadband adoption in the European Union is very fragmented. The degree of competition is an important determinant of take-up, but other factors may be just as significant in determining the impact of broadband in our societies and economies. The close monitoring of these factors is therefore crucial in order to provide a fair, reliable picture of how the broadband market is evolving in each Member State and in the European Union as a whole.

Figure 13: **Percentage of EU27 Internet Users, activity done last 3 months**



Source: Eurostat Community Survey of ICT Usage in Households and by Individuals, 2007

Composite indicators can be useful tools in benchmarking the overall performance of countries. Such indicators measure multi-dimensional concepts that cannot be captured by a single indicator. In the coming months, the Commission will develop, in consultation with the Member States, a 'broadband performance index' to compare broadband developments in the Member States, describe the broadband environment and provide insights into the prospects of further progress in this area.

3.3. Online content: A year of try-out

Online content in Europe developed rapidly last year, but at a highly uneven pace. The overall use of online media by the public is growing fast across the whole of Europe, with areas such as user-created content, online games and online advertising all showing considerable developments. However, several forms of commercial content were held back by the lack of widely attractive services and fast broadband access in parts of the EU. In 2007, significant commercial sales markets could be established only in a handful of countries for some types of content. For most indicators, there are no EU-wide data on this point, partly due to the commercial market being experimental. Most content traffic still seems to be in advertising-supported markets, in the domain of user-created content, in public services or otherwise outside the commercial sphere. Making services broadly available and consumer-friendly currently appears to be the most important challenge.

The overall use of online media by the public grew significantly across EU27 in 2007 (Figure 13). TV and radio had the largest growth, with 31%, while games, film and music grew by 24%. Sweden and the Netherlands saw over 80% growth in the use of web-based TV or radio, while growth was 55% in the UK and 40% in France. The Nordic countries along with the Netherlands lead the way in total online media use.

Young people are more active users, and their online activities have started to cut into offline activities. According to one recent survey[26], 82% of 16-24-year-olds used the Internet daily, exceeding television use by the

26 Synovate/SPA study for the European Interactive Advertising Association, 'EIAA Mediascope Europe Study'. Countries: UK, DE, FR, BE, NL, ES, IT, the Nordic countries.

same group, which declined to 77%. According to Ofcom data[27], around a third of users in five major countries felt that online activity led to cutbacks in offline activities.

User-created content and social networks experiencing rapid growth

User-created content experienced especially rapid take-up, confirming the Internet as a medium of two-way communication, but now on the richer level facilitated by broadband access. 24% of European citizens posted or participated in online fora in 2007, up from 18% in 2006, with Estonia the most active country at 44%.[28]

Content types span the full range from video, books, photos and music to blogging on social network sites, social bookmarking, micro-blogging and product reviewing. The rise of both advertising-supported and revenue-sharing social networks and web 2.0 services has boosted the development of the participative web, while at the same time further blurring the lines between private communication and publishing, between income-generating activities and creative hobbies. Furthermore, this rapid growth creates significant differences between usage measurements conducted only months apart.

Although no official pan-European figures exist for participation in social networks, some ad hoc sample surveys have been undertaken. A December 2007 industry study[29] examined ten Western European countries, finding that 42% of users spent time on social network sites, with mail and search being the most popular online activities. Ofcom data from October 2007[30] suggests that social networks are used by 39% of Internet users in the UK, 17% in France, 12% in Germany and 22% in Italy. *Usage* figures for creative content are usually markedly higher than content *contribution* figures and, in the same four countries, between 42% and 44% of Internet users uploaded photos.[31] Another industry survey[32] suggests that in the UK, 20% of Internet users contribute to user-generated content and social network sites, while 9% of German users contribute to video sites alone.

Online content markets: individual countries succeeding in different markets

While user-created content has experienced massive growth all over Europe, the picture for the commercial content market is more diverse. The number of users of audiovisual content in general, including games, grew by 24% across EU27 in 2007.[33] For audiovisual content only, an industry study[34] covering ten Western European countries found that the number of users increased by 150% from 2006 to 2007. These developments are highly fragmented: a single country can lead in one area but be falling behind in another, while many countries still have underdeveloped markets in several types of content.

In **online music**, for instance, the UK is the clear number one market in Europe, with €103 million in revenue; Germany is second at €53 million and Italy third at €35 million[35]. The total European market has annual revenue of almost €300 million. Currently, online sales account for about 4% of the total European music retail market, and growth is expected to continue in the coming years, reaffirming the positive outlook for the future market in online music.

In the **video-on-demand** market, the Nordic countries are clear leaders, with only France and Germany having significant markets in the rest of Europe.[36] In the third quarter of 2007, Sweden was the single largest market, but with no more than 449 000 individual streams or downloads. While

27 Ofcom Research, 12/12/07, 'The International Communications Market 2007', October 2007 data.
28 Eurostat Community Survey of ICT Usage in Households and by Individuals, 2007.
29 op. cit. footnote 26.
30 op. cit footnote 27.
31 Ibid.
32 IBM Institute for Business Value, 2007, 'The end of advertising as we know it'.
33 Eurostat Community Survey of ICT Usage in Households and by Individuals, 2007.
34 op. cit. footnote 26.
35 ScreenDigest Broadband Media Intelligence Database and Games Intelligence Database 2007/2008.
36 Ibid.

a quarter of Europeans watch video online, the commercial download market is still not attracting a significant audience. By contrast, the BBC launched a new part-streaming, part peer2peer-based service in the UK near the end of 2007. This service alone skyrocketed to over 250,000 streams *per day* in the weeks around the turn of the year from 2007 to 2008, averaging 25 minutes per stream, with 'long-tail' content being a key factor.[37]

In **IPTV**, France and to a lesser extent Belgium are leading the way. Of the 7.3 million subscribers in Europe, France alone has more than 5 million, and growth has been rapid.[38]

The **online gaming** market is currently the most solid market across Member States, and growing rapidly. Massive online role-playing games were expected to obtain over 3 million subscribers by the end of 2007, with revenues surpassing €300 million in 2007, a growth of 28% in one year.[39] The market is still behind the US market, which had about 4 million users. Take-up seems to somewhat follow the take-up of broadband, with Germany as the largest market and France growing most rapidly.

This picture of fragmented development has several possible explanations. On one hand, the access to reliable, high-speed broadband is important, Furthermore, factors like access to licensed content and services clearly matter. However, countries with otherwise quite similar user bases can still miss out on one type of content while doing well in another, suggesting that local situations as well as the availability and attractiveness of the services on offer locally are key factors.

Business model innovation and the introduction of new services

Growth of the online content market has brought opportunities to test innovative services and new business models. Downloaded content has become available on a cross-platform basis with improved interoperability. In the case of online music, there are stores offering optional DRM and varying quality levels; artists have tested out flexible online sales models on an individual basis and taken advantage of new outlets and sales channels through social websites, online aggregators or online malls; there are offers combining creative-commons licensing and free downloading while still retaining collection society backing and airtime royalties. There is evidence from specialist stores and record labels that these innovations have resulted in a much larger share of revenue coming from online offerings including various types of subscriptions, flexible formats and up to studio quality high-definition sound. Fixed-license schemes linked to broadband or mobile subscriptions also have been launched, as well as advertising-supported services. Direct-to-mobile or direct-to-music-player sales are now available in several Member States.

Online advertising, where it has been measured, has been growing solidly. Spending on advertising in the reporting countries[40] was expected to pass €11.5 billion in 2007, an increase of 38% since 2006. This growth marks an accelerating shift from traditional to online advertising, with the European online advertising market closing the gap to equivalent US spending on advertising, estimated at €13.6 billion in 2007.[41]

Overall, Europe still seems to be at an experimental stage, with very few large-scale operations, and it is too early to point to any single model as the most successful and most acceptable for consumers. For much content, there is still a wide gap between user activities and expectations in general and the use of commercial services. It is also still clear that the difficulty of licensing across borders hinders or blocks the roll-out of new services, leading to many new innovative services only being available outside the EU or in just one or a handful of Member States, or even from only a single operator. Take-up of broadband remains an obstacle to various degrees, given the wide differences in take-up among Member States. However, the obstacles are becoming less significant, there are now examples of success in most areas to build on, and advanced general use is growing strongly among European Internet users. The growth in participative web services has been impressive. All in all, the online content picture is solid and expectations for the coming two or three years should still be high.

37 Ibid.

38 Ibid.

39 Ibid.

40 IAB Europe, December 2007; countries surveyed include Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Netherlands, Poland, Slovenia, Spain, UK, Norway and Turkey.

41 Ibid.

4 Innovation and R&D

4.1. R&D: Opening up innovation systems

Knowledge and innovation comprise one of the four priority areas agreed by the 2006 Spring European Council as the pillars of the renewed Lisbon Strategy, the new partnership aimed at securing sustainable growth and jobs. Member States have followed up this decision by setting targets and taking steps to increase investment in research and development. The commitments by the Member States have been complemented by the adoption of the Seventh Framework Programme (FP7)[42], which increases EU-level funding by 75% compared to the previous programming period and provides a framework and financial support for major public-private partnerships.

But much more is needed to attain Europe's objectives, including the target of 3% R&D intensity[43] by 2010. EU R&D intensity has stagnated since the mid-nineties. In 2005, less than 1.9% of GDP was spent on R&D in the EU27, a level still significantly lower than in the US (2.67%), Japan (3.17%) or South Korea (2.99%). Sweden and Finland are already well above the 3% targets, while Germany, Denmark, Austria and France are the only other Member States with R&D intensities above the EU average. If Member States achieve the R&D intensity targets announced in their National Reform Programmes, average R&D expenditure in the EU will increase to 2.5% in 2010. However, the trend towards the internationalisation of R&D beyond the traditional regions is making it possible for new emerging economies such as China to rapidly catch up. If current trends continue, China will be at the same level as the EU by 2009 in terms of R&D intensity[44].

R&D investment, at both EU level and worldwide, is concentrated in a few sectors, and a large share of overall spending on total business R&D is accounted for by investment in ICT research. In the EU, the share was about 26% in 2004, but this average figure masked large disparities among the Member States, from 63% in Finland to around only 8-9% in the countries at the lower end of the EU ranking.

Investment in ICT R&D is among the fastest growing R&D efforts worldwide according to company data from *The 2007 EU Industrial R&D Investment Scoreboard*[45]. At world level, between 2005 and 2006, the highest R&D growth rate was seen in 'pharmaceuticals & biotechnology' (+15.8%), followed by 'technology hardware & equipment'[46] (+13.1%) and 'software & computer services' (+12.9%).

Sectoral analysis sheds further light on the difference in R&D growth between EU and non-EU companies. Table 4 takes a closer look at R&D investment by EU companies in significant ICT sub-sectors:

42 Seventh Framework Programme of the European Community for research and technological development for the period 2007 to 2013.

43 R&D expenditure as a percentage of GDP.

44 European Commission, 'Towards a European Research Area. Science, Technology and Innovation. Key figures 2007'.

45 http://iri.jrc.es/research/scoreboard_2007.htm (JRC, European Commission).

46 This includes computer hardware, telecom equipment, etc.

Table 4: **EU companies' R&D investment by sector**

	Change 2006-2005 %		CAGR 3 years — %		R&D intensity 2006 (% R&D/sales)	
	EU	Non-EU	EU	Non-EU	EU	Non-EU
Fixed-line telecoms	21.6	2.2	12.8	-3.7	1.6	1.6
Telecom equipment	5.6	17.9	-0.2	9.2	11.6	11.4
Software	15.5	12.9	11.2	5.8	13.8	15.1
IT services	3.2	3.4	-7.6	3.2	3.1	5.8

Source: The 2007 EU Industrial R&D Investment Scoreboard (JRC, European Commission)

In 'fixed-line telecoms' the rise in R&D expenditure is attributable to just a few companies, mainly BT but also France Telecom and TDC. This investment can to a certain extent be explained by NGN-related research. However, R&D intensity in the sector is still moderate. The 'software' sector appears to be very research-intensive (13.8%) and characterised by growing R&D investment. SAP is by far the leading EU company in this respect. In 'telecom equipment' the increase in R&D investment in 2006 over the previous year is moderate but the compound annual growth rate is declining, although the sector continues to have high R&D intensities. The rise in 2005/2006 is partly attributable to the three major companies in this sector; Nokia, Ericsson, and Alcatel-Lucent. The research intensities of EU ICT companies are more or less equivalent to those of their main international competitors. Growth in R&D investment in fixed-line telecoms and software is higher in the EU, but EU companies are falling behind in telecom equipment.

National accounts data show that ICT R&D spending per capita in 2006 was just above €50 in the EU, whereas the US and Japan spent more than €200 per capita. However, focusing only on shortfalls in R&D investment does not provide a complete picture of the effort that the EU needs to make to better exploit the full potential for innovation and competitiveness. The EU shows a persistent innovation gap with its main international competitors, especially with the US, but the 2007 European Innovation Scoreboard[47] shows that the gap has been decreasing, particularly for some innovation indicators including broadband penetration and ICT expenditures. It is important to adopt a more holistic approach to R&D and innovation and look at the entire innovation system, at sectoral level as well. This is especially true in a globalised economy where R&D is becoming increasingly internationalised and easily transferable. In these circumstances, only fully functioning and integrated national innovation systems will be able to retain and attract investment in R&D.

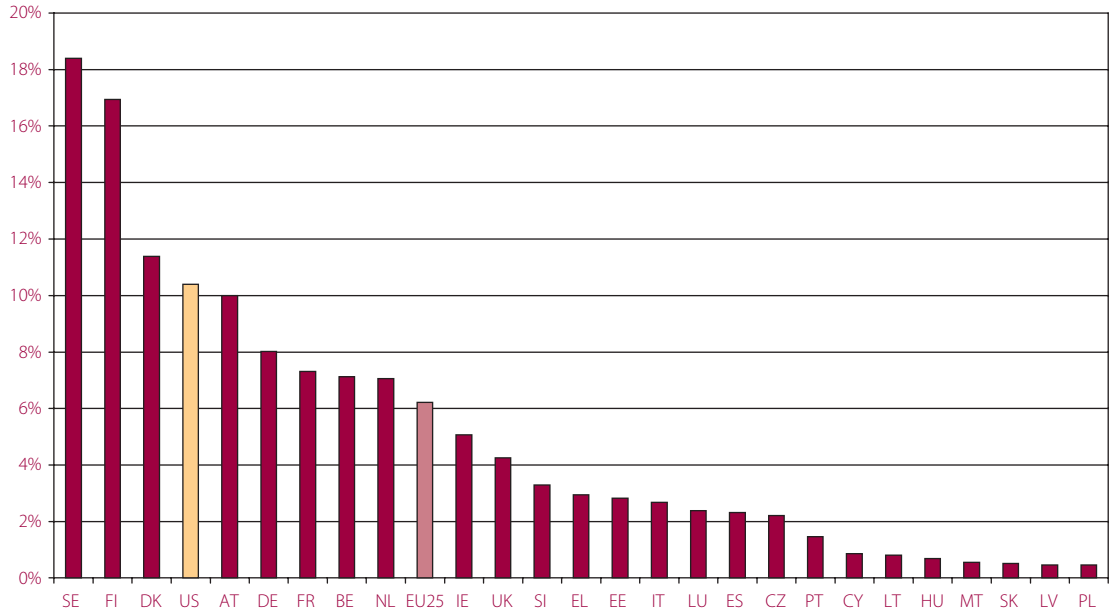
Sectoral innovation systems

The process of innovation is nowadays understood as a systemic model in which innovation arises from complex interactions between individuals, organisations and the environment in which they operate (enterprises and their R&D, universities, research institutes, institutions and their public policies). Research is only one among several components in successful innovation. While recognising that research, as the source of invention, is a major contributor to innovation, policy intervention should also focus on the critical importance of other parts of the innovation system, in particular where they affect the flow of knowledge among various actors.

Within an innovation system approach, identifying a failure means identifying deficiencies in the functioning of the system, i.e. identifying those systemic components that are lacking, inappropriate or are not working (for example, weak knowledge transfer between universities and industry). Public policy intervention is then required to address these system failures by targeting the factors at the source of the failure.

47 The EIS attempts to benchmark, on a yearly basis, the innovation performance of Member States, drawing on statistics from a variety of sources, primarily the Community Innovation Survey (http://www.eis.eu).

Figure 14: **ICT Business R&D intensities in EU25 and the US BERD/VA (2004)**



Sources: IPTS-REDICT based on data from Eurostat, OECD, EU KLEMS and national statistics

Unlike the 'national system of innovation' (NSI)[48] approach, which considers the flow of technology and information among people, enterprises and institutions from a geographical perspective, the sectoral innovation system concept[49] provides a framework for examining factors that affect innovation in specific sectors. The assumption is that innovation and technological change have different rates, types and trajectories depending on the sector in which they take place. Actors and institutions within a sector all exert a major influence on innovation.

The analysis of a sectoral innovation system is based on three building blocks: *knowledge and technologies; actors and networks* (including individuals, firms, research and financial organisations and their interactions); and *institutions* (including norms, routines, common habits, established practices, rules, laws, standards, etc).

Using this approach, the following analysis[50] attempts to explain the factors that affect the global competitiveness of EU countries from the perspective of the innovation systems of their ICT sectors. The analysis focuses on the actors and the institutions (and their systematic interactions) involved in the generation and transfer of knowledge relevant to innovation and its commercialisation within the ICT sector in question, but also pays a great deal of attention to the sector's R&D intensity.

Regarding R&D intensity[51] (Figure 14), the ICT sectors of Sweden, Finland and Denmark, where the BERD/VA[52] ratio exceeds 11%, stand out as exceptionally research-intensive, with levels above the US. Another group, where research intensities range between 10% and 4.3%, can still be characterised as very research-oriented. In a third group of countries, comparatively little is invested in ICT R&D/

48 Freeman, C., 1987, "Technology and Economic Performance: Lessons from Japan", Pinter, London; Lundvall, B-Å. (ed.), 1992, "National Innovation Systems: Towards a Theory of Innovation and Interactive Learning", Pinter, London; Nelson, R. (ed.), 1993, "National Innovation Systems. A Comparative Analysis", Oxford University Press, New York/Oxford; Patel, P. and K. Pavitt, 1994, "The Nature and Economic Importance of National Innovation Systems", STI Review, No 14, OECD, Paris; Metcalfe, S., 1995, "The Economic Foundations of Technology Policy: Equilibrium and Evolutionary Perspectives", in P. Stoneman (ed.), Handbook of the Economics of Innovation and Technological Change, Blackwell Publishers, Oxford (UK)/Cambridge (US).

49 Malerba, Franco (ed.), 2004, "Sectoral Systems of Innovation. Concepts, Issues and Analyses of Six Major Sectors in Europe". Cambridge University Press.

50 The analysis is based on preliminary results of a study carried out by a consortium of ISI-Fraunhofer, TNO, ArcSystem GmbH and IAE-HAS for the Joint Research Centre (JRC–IPTS) of the European Commission in the context of a larger project on R&D in the ICT sector in Europe, launched by the European Commission.

51 R&D intensity here is calculated as $BERD^{ICT}/VA^{ICT}$, using national accounts data. This is the R&D intensity of the ICT sector.

52 BERD is Business Expenditure on R&D and includes all R&D carried out in the business sector (as opposed to government, higher education and private non-profit sectors) in a given country, regardless of the source of funds. VA is value added.

VA, i.e. 3.3% to 2.2%. Finally, there is a group of countries where ICT BERD does not play any significant role, with the BERD/VA ratio remaining around or largely below 1%.

R&D intensity is a very important factor, but it is not the only one nor is it the most relevant for a full understanding of the differences in innovation across Member States. This requires a deeper insight into the typical features and characteristics of ICT innovation systems in the various countries through the analysis of qualitative information on the building blocks of the sectoral innovation system approach. The result of this analysis shows that ICT innovation systems and policies in the EU Member States vary considerably, confirming the very **fragmented picture of ICT innovation systems** and the persistent wide differences in research and innovation performance **across Europe**.

Among the very innovation-oriented countries — those with ICT R&D intensities above the EU average — three (Sweden, Finland and the Netherlands) have ICT innovation systems characterised by relatively dense, very specialised, highly innovative and dynamic networks (partly market-, partly policy-driven) linking universities, polytechnics, public research organisations and industrial firms. A common feature of these innovation systems is their strong dependence on one or few large companies dominating the ICT sector. This dependence has certainly been very beneficial for their economies, but it could prove dangerous since innovative activities outside the interest of these companies risk being neglected.

Denmark, Austria and Belgium can also rely on a comparatively well-developed and well-functioning ICT innovation system which can be described as market-based and competitive, although more an important sub-sector of the national innovation system than a complete innovation system in itself.

The ICT innovation systems of Germany and France can be characterised as decentralised, diverse and institutionalised with an important role played by intermediary institutions. These same characteristics can be found in the UK ICT innovation system, although with an R&D intensity below the EU average. An explanation for the lower ICT R&D intensity of the UK could be that its innovation system is characterised by the high involvement of foreign firms, which tend to spend less on R&D than UK-owned firms[53]. Large foreign-owned firms seem to rely more on R&D input from overseas and to spend less on R&D within the UK. In addition, in the ICT sector the UK only has few large R&D players in high R&D-intensive sectors such as software and electronics. The ICT innovation systems of the countries with ICT research intensities below the EU average are very diverse.

The ICT innovation systems of Italy, Spain, Portugal and Poland are quite heterogeneous. They are rather fragmented, with low levels of interaction among the various players, which are all present but not really integrated. There is no synchronised horizontal cooperation between the public bodies in charge of innovation and university-industry linkages are poorly developed.

The ICT sectors in Slovenia, the Czech Republic, Hungary and the Slovak Republic are characterised by the dominance of foreign-controlled activities. Foreign investors have outsourced their production to these countries, attracted by skilled labour forces and wage advantages, but their level of ICT R&D spending remains low. The links between research institutions and the business sector are weak. Even though Ireland has one of the most dynamic economies in the field of ICTs, its R&D capabilities are not particularly well developed and the ICT innovation system shows some weaknesses, especially in terms of the low level of industry-academia collaboration.

The ICT innovation systems in the remaining Member States are quite fragmented and not particularly well developed.

The analysis of the different ICT innovation systems shows that the ICT sectors with R&D intensities above and around the EU average are in countries that also have well-developed and well-functioning innovation systems. If the innovation system within the sector is not functioning well, investment in R&D will not bring the expected benefits.

This type of analysis can also identify which parts of ICT innovation systems work well within the EU and which need policy support. The EU must do more to strengthen its well-functioning national ICT innovation systems and to help the weaker ones catch up.

A stronger research base and, at the same time, improved mechanisms for effective knowledge transfer are essential for the competitiveness of the European ICT sector and for the creation of favourable conditions for retaining

53 DTI, 2005, "R&D Intensive Businesses in the UK", DTI Economic Papers No 11.

and attracting more business R&D. This is particularly relevant in a globalised economy where R&D is easily internationalised and moves towards countries offering 'winning' innovation systems, i.e. those characterised by close relationships between the business sector and research organisations, excellent universities and good collaboration between academia and the private sector.

Open innovation

The High-Tech Campus Eindhoven (HTCE) — the key element in the adoption of open innovation by Philips

The HTCE houses over 40 technology-based companies and institutes employing several thousand people in developing ground-breaking technologies and products through the open innovation model. Open innovation involves creating the environment and structures to promote interaction, networking and knowledge-sharing, leading to joint projects and joint ventures among the HTCE companies.

Philips Research can spin in ideas and innovations from outside, enriching the services it can offer Philips' business divisions. It can also spin out technologies from its own extensive IPR portfolio to high-tech companies in the HTCE, which can bring innovations to market more quickly. For the other companies on the campus, networking and cooperation on ideas is reinforced by shared facilities and technology.

The need for policy makers to focus on the functioning of the entire innovation system and on improving the knowledge transfer process becomes even more important with the emergence of new ways of innovating brought about by globalisation and the diffusion of ICTs.

Many companies are developing open-innovation models where value is created from the exchange and transfer of knowledge through networks, rather than from the knowledge generated within the firm itself. Companies are looking for other ways to increase the efficiency and effectiveness of their innovation processes by actively searching for new technologies and ideas outside the firm, but also through cooperation with suppliers, customers and lead users, as well as academia, open-source communities, inventors, innovation labs, innovation intermediaries, start-ups and even competitors. Furthermore, the results of the innovative process can go to market in many different ways, in addition to being released to the public through the company's own marketing and sales channels: e.g. through technology and IPR out-licensing and sales, joint ventures and spin-offs.

The ICT sector is one of the leading sectors with regard to open innovation, and these changes in business strategies would not have happened without ICTs as a key enabler. The technological success of open source software, such as Linux and Apache, has played an important role in spreading open innovation thinking.

Partnerships continue to be at the heart of the ICT innovation process, as public-private and industry-academia collaborations in R&D and innovation help Europe master and shape ICT development and use. Collaborative research is used not to substitute but to complement internal resources in the innovation process, enhancing innovation input and output. The result is that today a larger percentage of innovative products within a company have elements that originated from outside the company than was the case in the past. In such an open and collaborative innovation model, the flows of knowledge between the various players of the innovation system in its broad sense are as crucial as internal research capabilities.

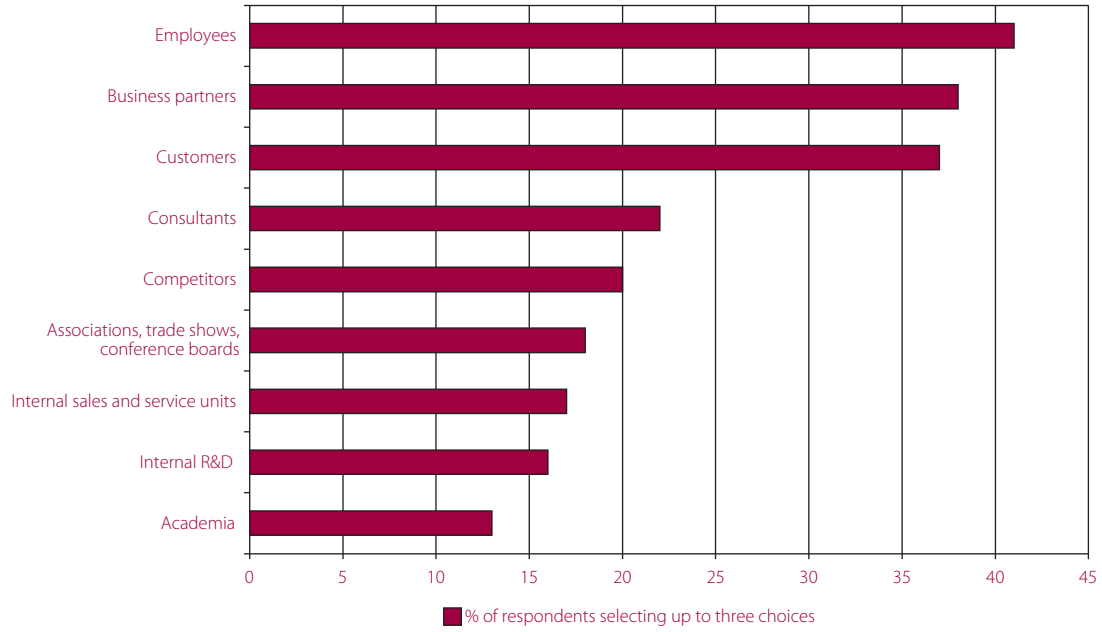
An important aspect of this new innovation strategy is the role played by consumers and end-users (user-driven innovation). The user turns out to be a true source of innovation for a company engaging in open innovation.

In a survey[54] of business leaders on the sources of innovative ideas, the wide use of sources other than internal R&D, such as business partners, consultants and customers, suggests that many companies are turning to more open innovation models (Figure 15). In particular, the use of customers as a significant source of innovative ideas confirms the emergence of a user-driven innovation model.

User-generated or user-created content is becoming an increasingly important aspect of the information society. In this context, user-driven innovation is expanding on a trend and embeds user value-generating activities deeper within the value chains of information society business models.

54 IBM, "The Global CEO study 2006", based on interviews with 765 CEOs and business leaders.

Figure 15: **People power — Most significant sources of innovative ideas**



Source: IBM "The Global CEO study 2006", based on interviews with 765 CEOs and business leaders

Nokia Maemo Tablet[1]

The Nokia Maemo Tablet PC 770 — a product promoted by Nokia for use in the Nokia 770 Internet Tablet and 800 — is based on an open source core. Nokia contributed around only 200,000 lines to the already existing open source core of around 15,000,000 lines. In other words, only 1.5% of this product was developed internally by Nokia: a significant substitution of in-house R&D with external R&D.

1 The Nokia Maemo Tablet PC 770 was analysed in a study conducted for the European Commission on the 'Economic impact of open source software on innovation and the competitiveness of the Information and Communication Technologies (ICT) sector in the EU', 20 November 2006. Lead contractor: UNU-MERIT, the Netherlands.

Open source potentially saves industry over 36% in software R&D investment, and this substitution of internal R&D allows companies to increase profits or engage in further innovation[55]. This also means that companies can take on more risky innovation projects, as the financial risk is lower. One of the best examples of user-driven innovation is the open source community. Open source is developed by lead ICT users, either single individuals or employees or university staff (at least 570,000 individuals worldwide[56]).

Westwood Studios, an example of user involvement in the innovation process

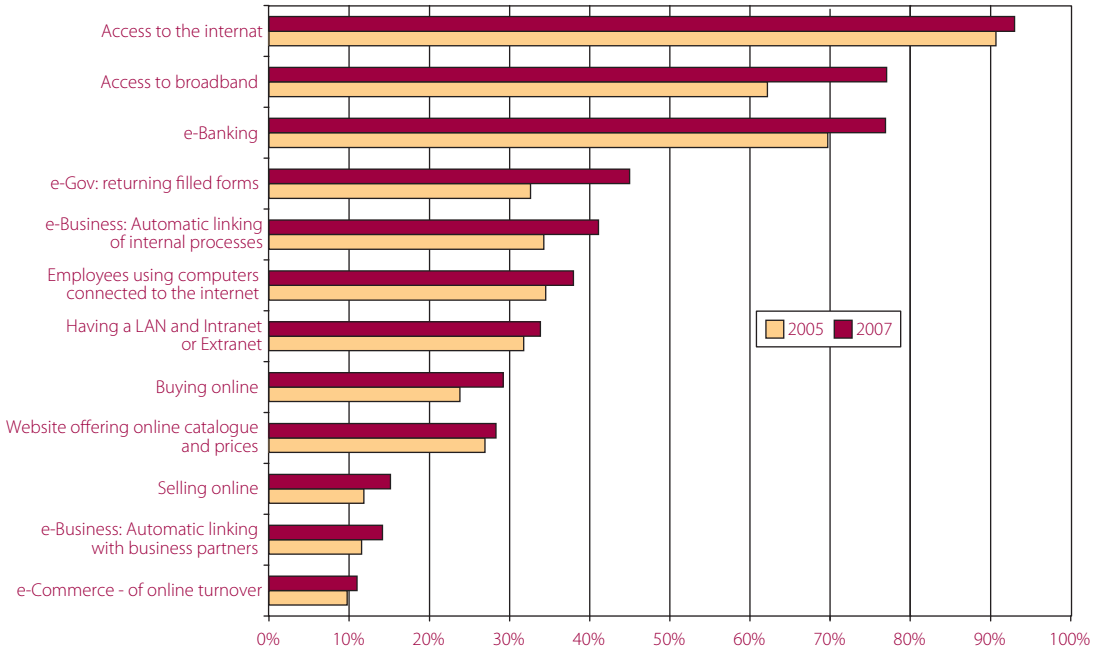
At the beginning of 2001, Westwood Studios, a developer of computer games, introduced its first toolkit for consumers, which has developed into what is now a software editor allowing computer game aficionados to build new graphic environments (e.g. maps and missions) into their games. Nowadays, Westwood Studios consumers do detailed design work and engage in week-long innovation exercises that, according to managers at Westwood, yield valuable content for the product.[1]

1 Lars Bo Jeppesen, 2003, "The implications of user toolkits for innovation", Copenhagen Business School.

55 Study on the: Economic impact of open source software on innovation and the competitiveness of the Information and Communication Technologies (ICT) sector in the EU. 20 November 2006. Lead contractor: UNU-MERIT, the Netherlands.

56 Study on the "Economic impact of open source software on innovation and the competitiveness of the Information and Communication Technologies (ICT) sector in the EU", p. 46, 20 November 2006, UNU-MERIT, the Netherlands.

Figure 16: **ICT use in enterprises 2005-2007 (EU average)**



Source: Eurostat, Survey on ICT use in EU enterprises. Data refer to all the enterprises, excluding the financial sector.[57]

Generally companies can involve users in different ways:

- Weakly — by listening to consumers using e.g. online surveys, market research methods, etc.
- Moderately — by interacting with lead users by letting them test pre-commercial products
- Strongly — by extracting 'sticky' knowledge from users by letting them become part of the R&D and innovation process, using for instance ICT toolkits.

However, the protection of intellectual property rights (IPR) is not typically addressed in these models other than that, in most cases, the innovating company retains all rights, except of course for open source development, where IPR issues are addressed separately.

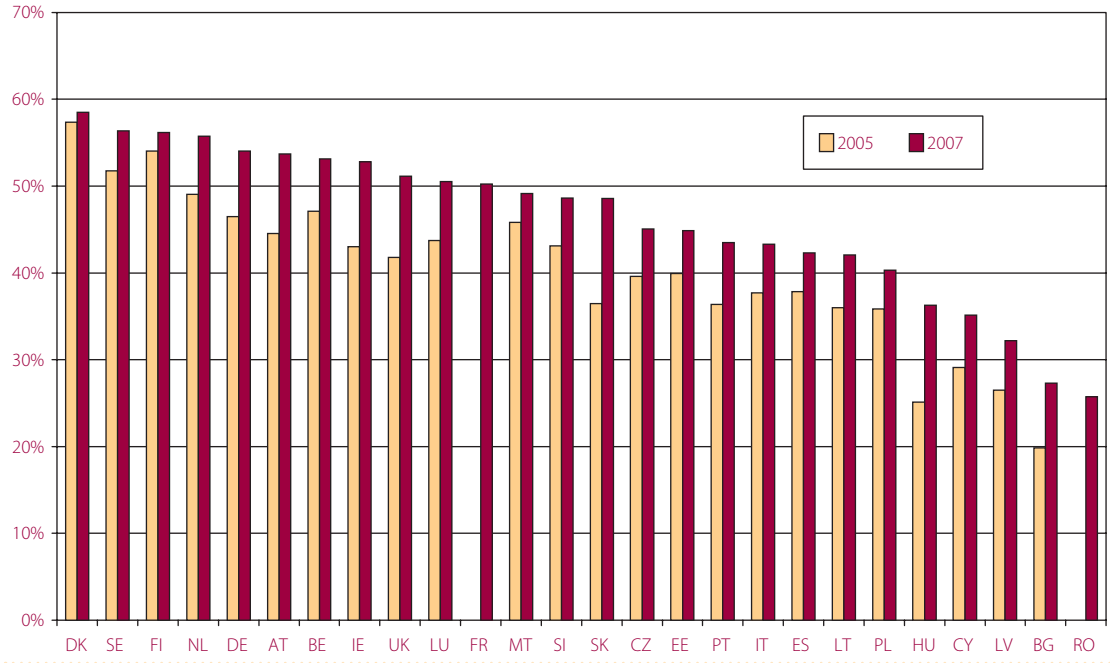
4.2. ICT uptake by enterprises 2005-2007

Connectivity and basic ICT uptake have visibly progressed since 2005: By 2007, 77% of all businesses had a broadband connection (97% of large enterprises and 77% of SMEs) and 77% were using the Internet for dealing with banks. In addition, enterprises started making significant use of e-government services, stimulated by progress in the greater availability and sophistication of online public services (Figure 16).

As highlighted in section 1, the uptake of ICTs by businesses yields important economic benefits as long as it is accompanied by investment in business reorganisation.

57 All the indicators listed in the chart are expressed in terms of % of enterprises, except for online turnover (as % of total enterprise turnover) and the percentage of employees using computers connected to the Internet (as % of total employment).

Figure 17: **Average levels of ICT uptake by enterprises**



Source: Commission estimates based on the Eurostat Community Survey on ICT use in EU enterprises. Data refer to all the enterprises, excluding the financial sector.

However, evidence of the potential impact of ICTs on the efficiency of enterprises is mixed: while progress has been made in the use of applications for the automatic exchange of information inside enterprises (now practiced in more than 40% of EU businesses, in particular large enterprises), the use of ICTs for transactions with business partners is still limited to a small subset of enterprises. Only 15% of all enterprises are selling online[58] and slightly fewer have established automatic links with their business partners. The challenges hampering electronic linking beyond enterprise boundaries are interoperability and standards issues as well as legal concerns, and are particularly burdensome for SMEs.

Differences in ICT take-up across Member States are becoming increasingly evident. A comparison of average take-up levels across countries[59] shows that they range from 27% to almost 59% (in 2007), with the degree of fragmentation remaining basically constant over the period 2005-2007[60] (Figure 17).

The deployment of ICTs in business processes requires significant investment, which is more likely to be carried out by large organisations. Investment requirements are one of the main sources of the gap in ICT take-up between SMEs and large businesses. Data weighted by enterprise size indicate that the impact of ICTs on the economy is larger than suggested by aggregate un-weighted data[61].

For example, the use of digital signature is limited to 17% of all enterprises, but these same businesses employ more than one quarter of the workforce in the EU. The

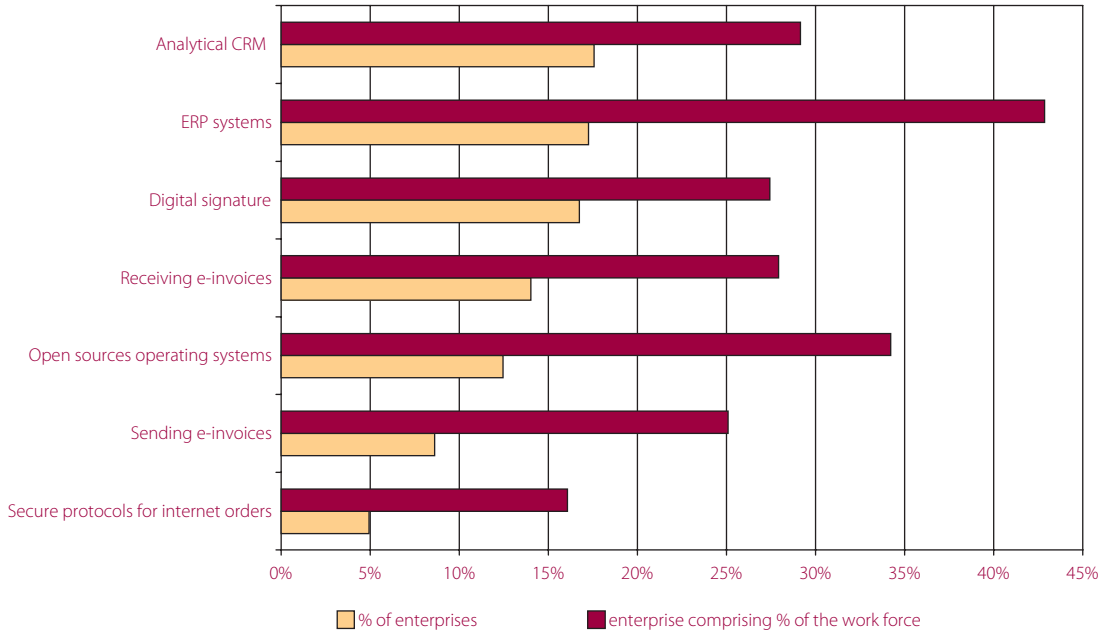
58 Via the Internet or other computer-mediated networks (at least 1% of turnover).

59 The average take-up in each country is equal to the mean of the indicators shown in Figure 16, except for those not expressed in terms of percentage of enterprises.

60 A relevant statistical test does not support the hypothesis of different levels of variability among countries, between 2005 and 2007.

61 The weighting factor is the number of persons employed. Statistics weighted by enterprise size have been made available by Eurostat starting from the 2007 edition of the survey.

Figure 18: **ICT use in enterprises in 2007 (EU average)**



Source: Eurostat, Survey on ICT use in EU enterprises[62]

difference is even more striking when considering the use of ERP[63] systems, which require significant investment and are usually implemented in large and complex organisations: the 17% of all EU businesses using ERP systems represent 43% of the EU economy in terms of employment.

Overall, the uptake of e-invoicing is still low in the EU: only 9% of enterprises (representing the 25% of the economy) are sending them to their business partners. Obstacles include lack of standardisation, legal uncertainty, especially in international transactions, and lack of affordable software solutions. However, the take-up of e-invoicing is a good example of the gaps and differences across Member States. While in Northern countries enterprises sending e-invoices represent more than 40% of their economies, in most of the new Member States the move from paper to electronic invoices has just started.

62 Employment weighted figures on the use analytical CRM (Customer Relationship Management) have been estimated by Commission services on the basis of Eurostat data.

63 Enterprise Resource Planning.

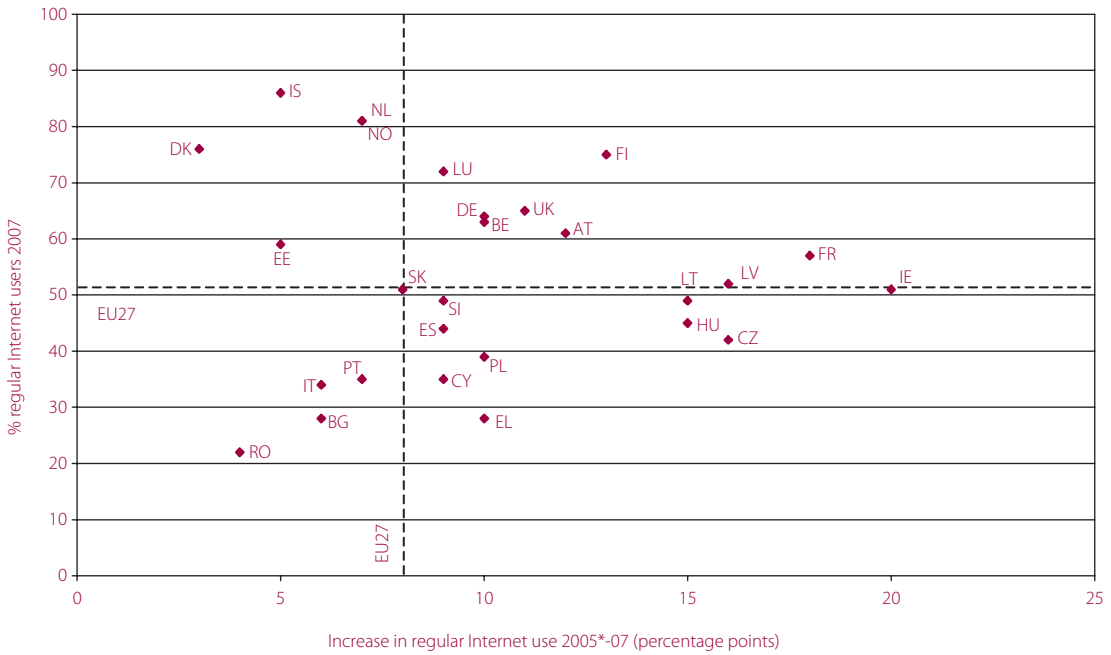
5 Inclusion and public services

5.1. eInclusion

The i2010 initiative has succeeded in bringing more and more people online: 2007 was the first year when over half of the EU population used the Internet regularly (51% of EU citizens accessed the Internet at least once a week, up 8 percentage points over 2006). Regular Internet usage has risen across the whole EU27, albeit at different rates (Figure 19).

In 2007, more than 50% of population were regular Internet users in 16 countries. Growth was very fast in Ireland (20 percentage points), France (18), in the Czech Republic and Latvia (16) and in Hungary and Lithuania (15). Despite good progress, some Member States still had both low percentages of regular Internet users and low growth rates (Bulgaria, Italy, Portugal and Romania). Denmark, the Netherlands, Iceland and Norway top the table and are close to saturation, with

Figure 19: **Trend in % Internet regular users in the EU, 2005-07**



*Source: Eurostat, Community Survey of ICT usage in Households and by Individuals. EU data without Malta. *2006 data used for BG, RO and FR no 2005 data available. ** Sweden was the only country decreasing its rate in Internet regular use by 1 percentage point since 2005 (currently being 75%) and for that reason has not been included in the chart.*

Figure 20: **Trend in the Internet regular use index in the EU by socio-economic classes, 2005-07**

Source: Commission services based on Eurostat, Community Survey on ICT usage in Households and by Individuals. EU data without Malta.

nearly the entire adult population using the Internet regularly in 2007[64].

Despite this progress, 40% of the EU population have never used the Internet. This issue is addressed by the i2010 eInclusion initiative. A Communication adopted in 2007[65] measured progress since 2005 on the various eInclusion targets set by the Riga Ministerial Declaration[66], which include halving the disparities in Internet use and digital literacy levels between disadvantaged groups and the EU population as a whole by 2010.

To monitor disparities in Internet use and digital literacy over time, two penetration rate ratio indexes were used to measure the difference between potentially disadvantaged groups and the EU average, which has been shown to be the most appropriate way to track and analyse such disparities over time[67] These show that there remain large disparities in Internet use and digital literacy levels between the overall EU population and the various disadvantaged groups.[68]

Comparison of Internet use by socio economic group between 2005 and 2007 shows there has been some reduction in disparities (Figure 20). The most disadvantaged groups are those aged 65-74, the retired and economically inactive, and those with low education. For each of these groups, average Internet use has moved closer to the EU average. This is not the case for those living in Objective 1 Regions for whom relative Internet use has declined. Students, the highly educated and young people remain at the top, but Internet use has declined relative to the average possibly because their usage rates are close to saturation while the average continues to grow. Average Internet use by citizens living in rural areas, women and the middle aged is close to the EU average and the relatively small difference has declined since 2005.

64 Note that those younger than 16 years of age and older than 74 are not included in the Community ICT survey.

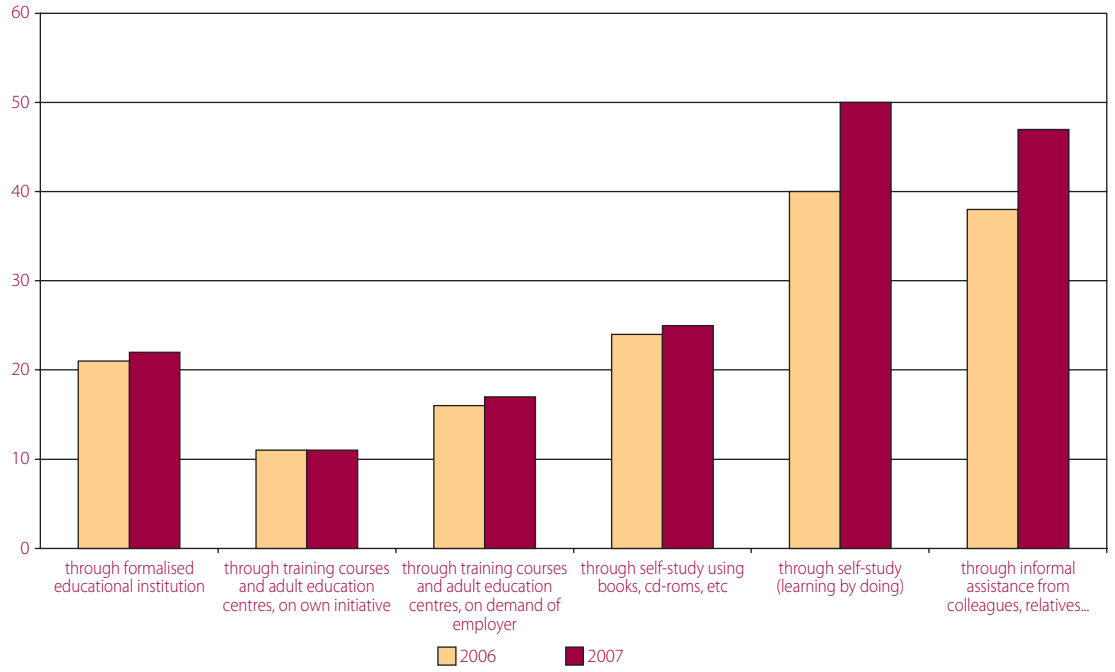
65 *European i2010 initiative on e-Inclusion - to be part of the information society* COM(2007) 694, http://ec.europa.eu/information_society/activities/einclusion/policy/i2010_initiative/index_en.htm.

66 The Riga Ministerial Declaration is available at http://ec.europa.eu/information_society/events/ict_riga_2006/index_en.htm.

67 See "Benchmarking from a policy perspective - eInclusion report", December 2006, http://ec.europa.eu/information_society/eeurope/i2010/docs/studies/wp5_benchpol_e-inclusion.doc.

68 http://ec.europa.eu/information_society/activities/einclusion/docs/i2010_initiative/rigadashboard.pdf.

Figure 21: **Ways of acquiring computer and Internet skills (% of individuals), 2006-2007**



Source: Eurostat Community Survey on ICT Usage in Households and by Individuals between 16-74 years old (2006-07). EU27 without Malta.

These findings, in particular that the elderly and the economically inactive are furthest behind but that women and the unemployed are getting closer to the average, is consistent with the results from the digital literacy disparity index[69]: Being in the labour force and of active working age facilitates access to the Internet and hence becoming digitally literate and a regular Internet user. Individuals outside the labour force (economically inactive) and/or in retirement age are less likely to be digitally literate. More detailed analysis of digital literacy levels by Member State and by socio-economic group will be reported in the Digital Literacy Review expected in 2008.

The Community Survey on ICT Usage in Households and by Individuals shows that there is also a trend towards obtaining and upgrading computer and Internet skills from informal sources (Figure 21).

The importance of Internet usage and digital literacy is underlined by the growth in online activities. As public and private services become increasingly available online, and at better quality, those people unable to access them face greater disadvantage. Since 2005, online activities have increased significantly in areas such as eGovernment, searching for health information and online transactions. The progress has been remarkable, given that such activities are normally performed less frequently or seasonally. Sending e-mails and online searches for goods and services remain the most common activities (Figure 22). [70]

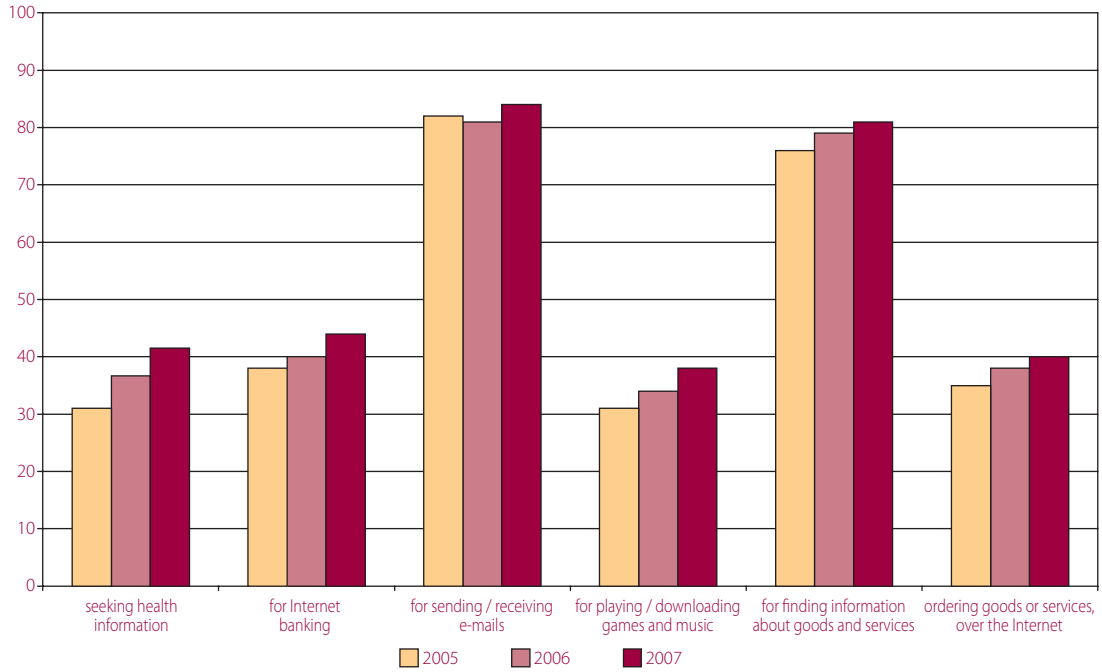
5.2. eGovernment

Europe continues to make progress in the supply of online public services and thereby is making major steps towards the goals of the Lisbon Strategy and the i2010 eGovernment action plan. Businesses are well served and suitably engaged. Citizens are generally less well served despite the fact that they are increasingly exposed to and versed in web services. This has the effect of widening the gap between the public and commercial online worlds. The challenge is to close this gap, delivering an experience that is attractive to citizens and meets their needs efficiently, consistently and economically.

69 Measuring progress in e-Inclusion, Riga Dashboard, European Commission 2007, (http://ec.europa.eu/information_society/activities/einclusion/docs/i2010_initiative/rigadashboard.doc)

70 Other activities were already commented on in section 2.3.

Figure 22: **Percentage of online users who used Internet in the last 3 months for:**



Source, Eurostat Community Survey on ICT Usage by Households and by Individuals between 16-74 years old (2006-07). EU27 without Malta.

Basic services[71] in all Member States are available online, and there has been a significant increase in the level of sophistication. However, there is a variation of around a 50 percentage points between the most and least advanced countries.

In terms of **full online availability**[72], Europe advanced from 50% in 2006 to 58% of basic services in 2007. This is the largest percentage increase for a single year since 2001. The gap between the leader (now at 100%) and the worst performer is 85 percentage points. This variation reflects the inherent difficulty in ensuring the full delivery of integrated ('front-to-back-office'), interoperable services, particularly in large and decentralised countries. Among the top ten performers, only three (UK, FR, DE) are large Member States (Figure 23).

There is a strong correlation between the **sophistication** and availability of eGovernment services. Five countries achieve 90% or above on both measures. Austria retains its leading position, followed by Malta, Slovenia, Portugal and the United Kingdom (the first of the large countries). Modest size has enabled rapid progress. However, a number of small Member States have not yet embraced eGovernment to the same degree. There are also a number of previously progressive 'old' countries whose progress has faltered somewhat over recent years.

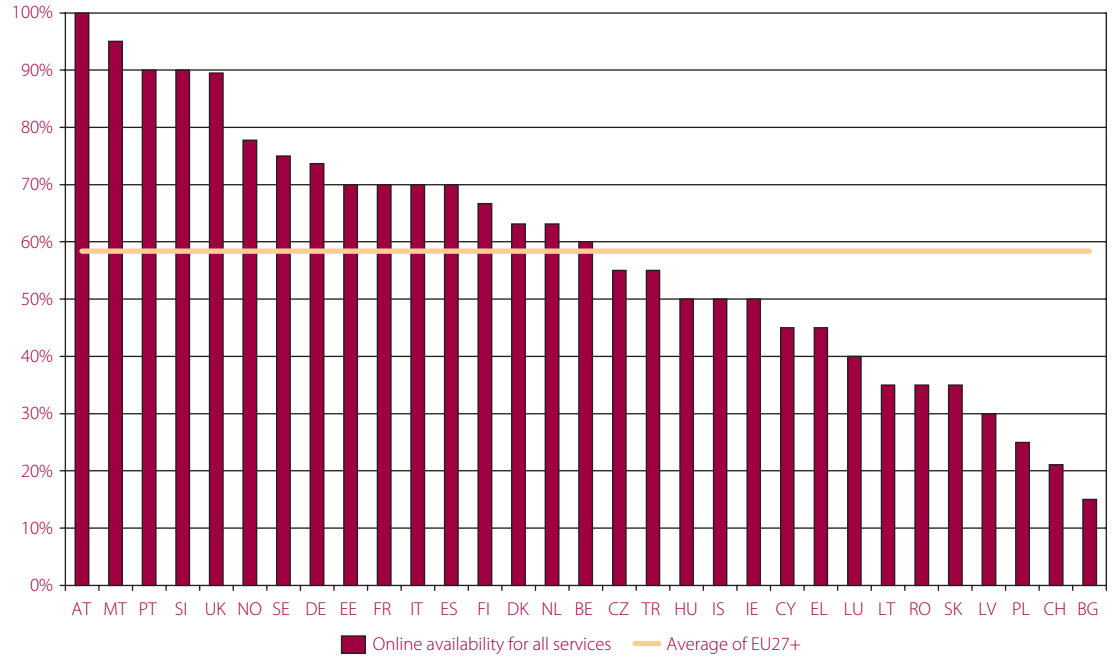
eGovernment is still progressing faster for business services than for services intended for citizens. The EU average for company registration fully available online, a good indicator for a business-friendly environment and crucial to the Lisbon agenda, is 79%. It is 100% in fifteen Member States, but in seven others (FI, NL, EL, BG, RO, LV, SK) it remains only at 50%. VAT and corporate tax declaration are both close to 100%, while the EU average for electronic procurement is 81%.

The situation is different for citizens. Sophistication stands at 70% and full online availability for services at 50%. The gap between the leader (Austria — 100%) and the worst performer exceeds 90 percentage points, although in some countries (UK, FI, NO, SI) citizens are now served as well as businesses.

71 Basic refers to the 20 services (12 for citizens, 8 for businesses) used to benchmark online availability of public services (full definition in "The User Challenge" Report, see next footnote).

72 All online availability figures are taken from "The User Challenge: Benchmarking the supply of online public services", European Commission 2007, http://ec.europa.eu/information_society/eeurope/i2010/docs/benchmarking/egov_benchmark_2007.pdf.

Figure 23: **Online availability for all services**



Source: Cap Gemini, "The User Challenge. Benchmarking the supply of online public services" 2007.

According to the Community surveys on ICT use in businesses and households, 2007 saw a significant improvement in the **take-up** of eGovernment services, both by individuals and businesses. For individuals, 30% of Internet users have interacted online with public authorities in one way or another. This represents a 6 percentage point increase relative to 2006, but still lags behind the figure for businesses (66%). However, the development is very encouraging, and is likely to signal a positive trend after years of slow growth in take-up.

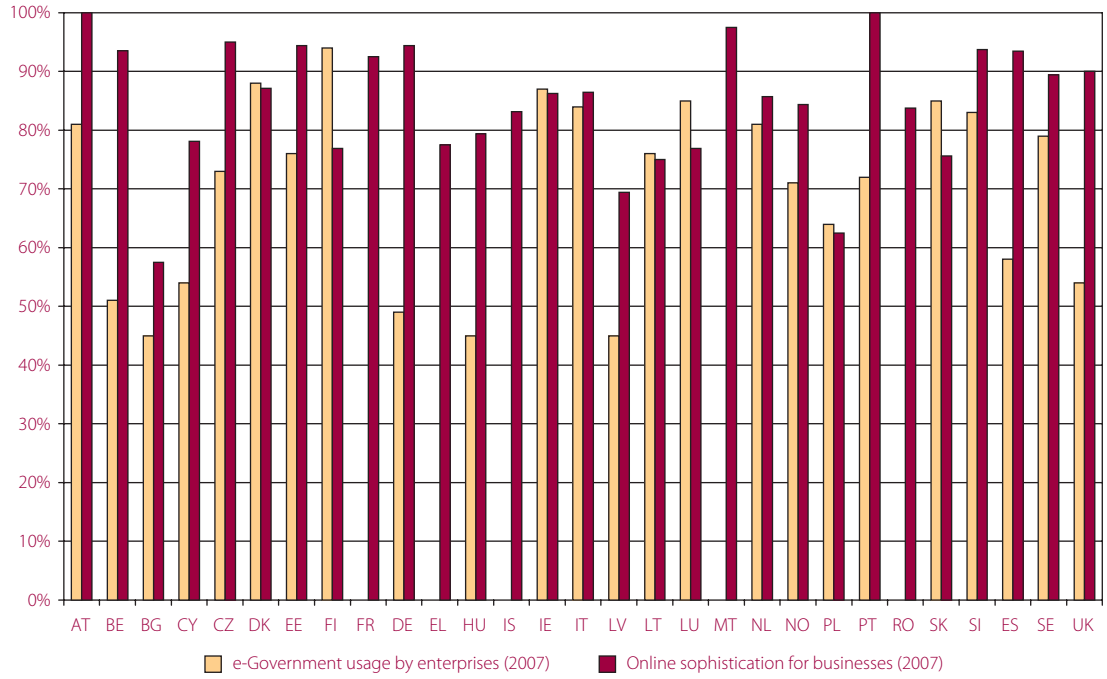
Nearly half of individuals and 61% of businesses have used eGovernment to obtain information. Where sophistication is concerned, nearly 22% of citizens were able to fill in forms online, up 10 percentage points since 2005, compared with 46% of businesses.

However, a substantial gap between supply and take-up remains in most countries. The difference is much more marked for citizens than for businesses. Those that have achieved both high take-up and a high level of sophistication include the Nordic countries, the Netherlands, and Luxembourg (Figures 24 and 25).

Monitoring of the full availability and take-up of eGovernment services does not convey the full picture for eGovernment developments, however. The Commission has carried out an analysis of the user experience and the elements important to this experience. The factors looked at were: the provision of a legally recognised, secure electronic identity; the accessibility of the service via alternative channels such as call centres, kiosks, mobile phones and TV; and, compliance of websites with the International Accessibility Guidelines. These **'User Centric Measures'** deliver a mixed result, the most striking finding being that only 5% of websites make specific reference to their compliance with international accessibility guidelines.

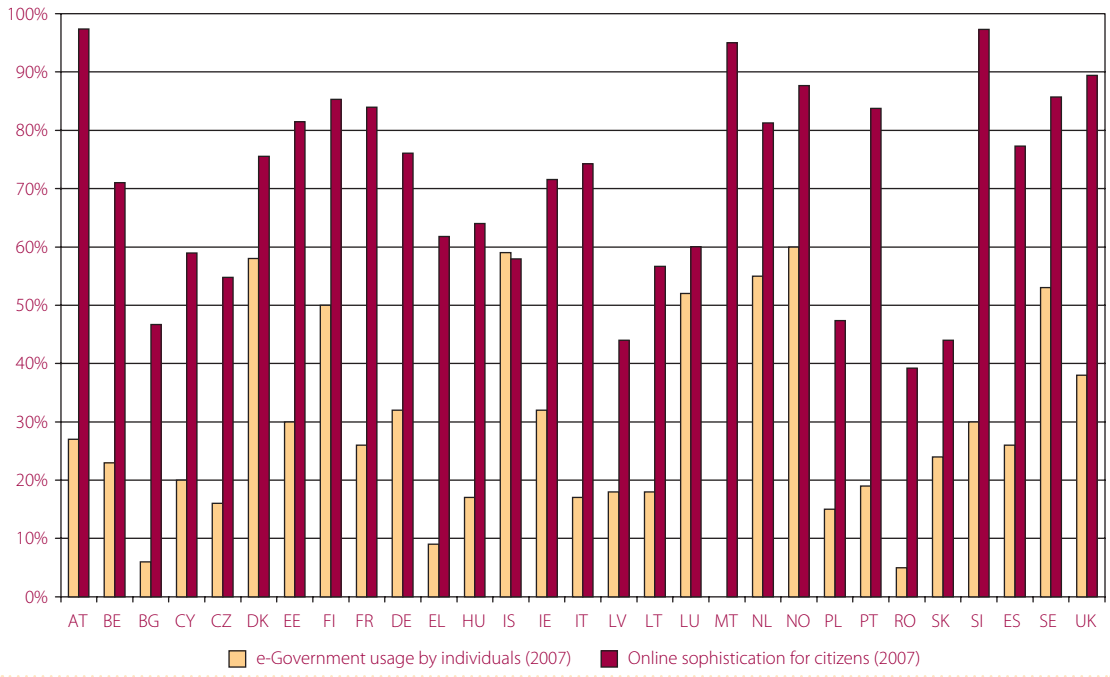
With a plethora of public administration websites available and the use of conventional search engines to access public services, there are clear efficiency benefits from delivering a **national** portal as a convenient trusted and branded route to public services. The Commission has now for the first time conducted an assessment of national portals, and the findings are very positive. Analysis of the availability of basic services, personalisation ('my portal'), and consistency of layout demonstrates that European governments have invested in delivering good national portals and that they are considered as cornerstones of national eGovernment strategies.

Figure 24: **Supply vs take up — businesses**



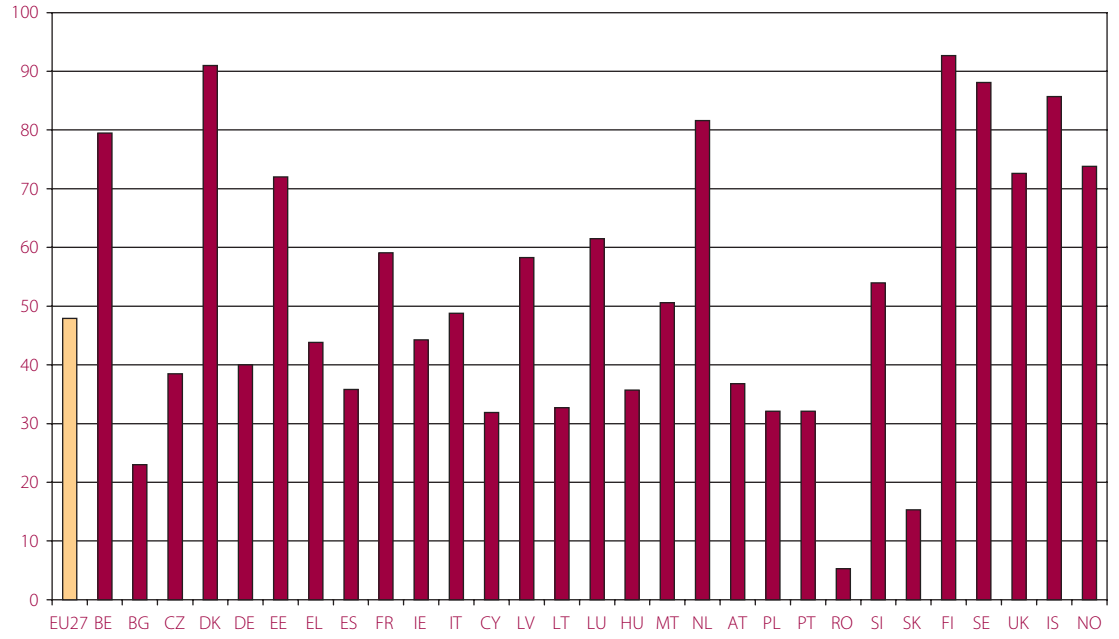
Source: Cap Gemini "The User Challenge. Benchmarking the supply of online public services", 2007, and Eurostat, Community Survey on ICT use in Enterprises, 2007.

Figure 25: **Supply vs take up — citizens**



Source: Cap Gemini "The User Challenge. Benchmarking the supply of online public services", 2007, and Eurostat, Community Survey on ICT use in Households and by Individuals, 2007.

Figure 26: **Broadband penetration in GP practices**



Source: Empirica, "ICT use among General Practitioners in Europe" 2008.

5.3. eHealth

In 2007, the Commission launched the Lead Market Initiative which sets out an agenda for the deployment of innovative eHealth services. The EU currently has a worldwide lead in the deployment of regional/national health information networks, and this lead could be turned into significant market opportunities for eHealth systems and services both within the EU and on world markets.

The Lead Market Initiative was also intended to address economic challenges in the health sector: health spending is rising faster than GDP and is forecast to reach 16% of GDP by 2020 in OECD countries. As the population ages, the costs of long-term healthcare are rapidly increasing, with serious implications for the sustainability of current health and social care systems. The Lead Market Initiative will focus on developing services and markets that can help make the sector more efficient (for example, by extending independent living and continuity in long-term care through the development of telemonitoring and telemedicine). While most eHealth investment has until now focused on generic ICT infrastructure in primary and secondary health care, future growth is expected in specialised eHealth services such as e-prescriptions, electronic health records, telemonitoring and homecare.

The GP survey

A telephone survey of general practitioners (GPs) across the EU27 in 2007 yielded positive results regarding the availability of computers and Internet use in primary health care: over 87% of GPs are using computers in the EU27 and 66% are using them routinely during consultations. About 70% use the Internet, although still only about half of practices are connected through broadband (Figure 26). Furthermore, there are wide differences across countries: Denmark having the highest broadband penetration (91%) and Romania the lowest (about 5%).

There are wide variations in connectivity between countries, which translate into differences in the efficiency of eHealth systems: Denmark, Finland, Norway and the Netherlands are the countries with the largest number of GPs connected to other health actors, while Latvia, Romania, Bulgaria, and Greece have the lowest overall connectivity.

eHealth potential is greatly enhanced where there are dedicated electronic health networks directly connected to other health actors (such as hospitals, insurance bodies, health authorities, pharmacies, etc.). From this point of view, GPs are still not sufficiently connected. Even though 55.2% have access to at least one other institutional network, rates are generally lower for secondary health

care connections (hospitals or specialists) and other health actors such as pharmacies (Table 5).

Table 5: **Percentage of GP IT systems connected to different health actors**

	Laboratories	Secondary health care*	Pharmacies	Patients' homes
EU27	38.8	24	6.8	2.0
BE	74.4	64	4.4	1.3
BG	6.8	8	2.9	2.9
CZ	24.0	10	1.6	4.3
DK	82.8	77	77.4	44.8
DE	67.6	9	2.0	2.8
EE	52.7	38	10.0	2.0
EL	4.1	6	2.2	0.3
ES	30.5	30	3.7	0.6
FR	31.5	17	1.0	0.3
IE	39.9	23	0.5	1.0
IT	9.7	15	0.7	1.0
CY	6.9	10	1.4	0.0
LV	0.6	0	0.0	0.0
LT	8.0	7	2.3	0.4
LU	38.2	14	0.0	3.2
HU	12.4	12	0.0	0.0
MT	9.8	14	3.3	2.2
NL	71.7	73	72.1	5.4
AT	25.8	34	5.4	1.7
PL	10.5	10	3.7	1.7
PT	1.8	21	1.8	0.0
RO	2.0	1	1.0	0.3
SI	20.4	17	4.9	3.9
SK	5.7	5	3.8	1.9
FI	89.2	82	3.2	2.0
SE	68.5	47	67.0	3.0
UK	77.1	52	5.1	1.6
IS	68.9	50	13.6	1.0
NO	78.9	76	3.4	1.0

Source: Empirica, "ICT use among General Practitioners in Europe" 2008. Practice computer system connected to various organisations (selective: original list included pharmacies, laboratories, health authorities, other GPs, specialists, hospitals, patients' homes, insurance bodies, other care) via Internet or dedicated electronic network (cf. indicator annex for more information), % values.
** Connecting to at least one other secondary care provider (hospitals, specialist practices).*

Connectivity to secondary care health actors (i.e. hospitals and specialists) is more frequent in smaller countries such as Denmark, Norway, the Netherlands or Belgium, probably because issues of interoperability between regional health systems in larger countries represent a significant challenge.

Finally, GP connections to pharmacies and patients' homes are not yet developed except in Denmark, which is leading in overall GP connectivity. Connectivity with other health actors is a prerequisite for implementing services such as telemonitoring, eReferral and ePrescription, which are key components of the European eHealth agenda.[73]

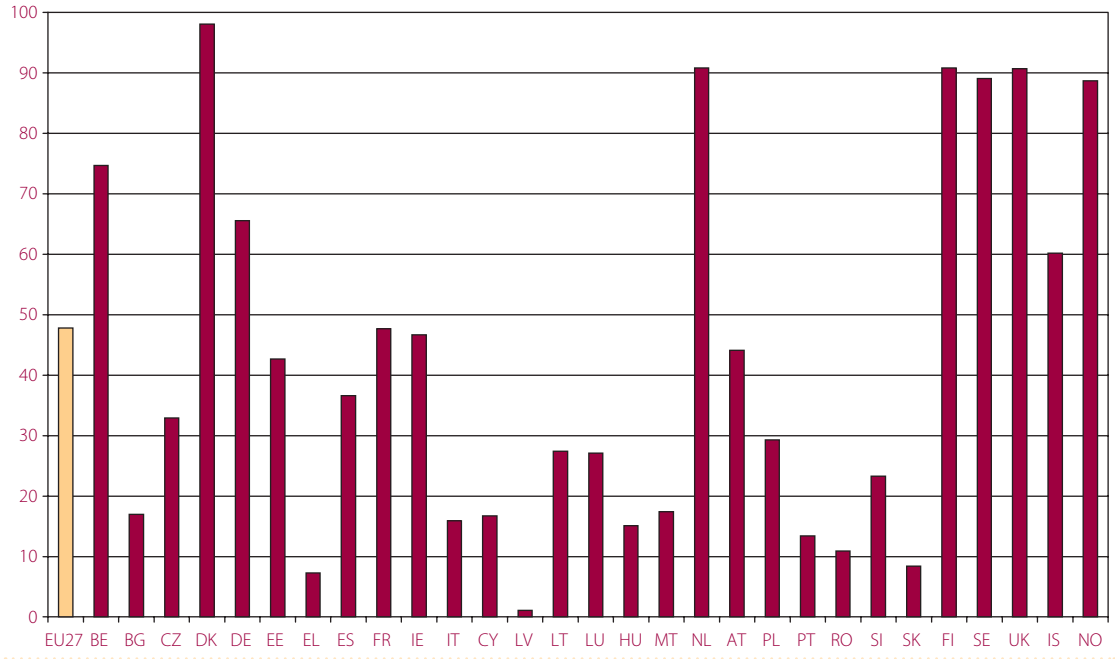
Those countries most advanced in terms of *access and connectivity* tend to perform above average in the *use* of networks for professional purposes. In Denmark, for instance, email is used extensively for communication between doctors and patients, with about 60% of GPs doing so (as against the EU average of 4%). Other examples include Finland and UK (77% and 53%, respectively, for making appointments with other care providers) and Sweden (9% using telemonitoring vs the 1% EU average). Similarly, wide differences can be observed in the exchange of patient data by electronic networks or the Internet (Figure 27).

A positive and consistent result across countries is the high percentage of GPs using the Internet and computers for their own continuous education (with a EU27 average of 82%).

The GP survey generally shows that differences in eHealth are currently particularly acute across countries. More eHealth benchmarking analysis at other health care levels and regionally will be performed during 2008 in order to assess further the existing gaps in deployment, take-up and use of electronic services for health.

73 See eHealth Action Plan, eHealth LMI, and eHealth ERA study and roadmaps (www.ehealth-era.org/).

Figure 27: **Electronic exchange of data for at least one purpose**



Source: Empirica, "ICT use among General Practitioners in Europe", 2008.

6 Conclusions

The Commission's Strategic Report on economic reform across Europe[74] demonstrates that the Lisbon Strategy is contributing to the recent much improved performance of the EU economy. However Europe will need to press ahead with further economic reforms at both Community and national level to cope with the impacts of global financial uncertainties and higher commodity prices. ICTs play a crucial role in stimulating labour productivity growth through their impact on innovation and efficiency. Progress is being made in all the main information society areas, but fragmentation between Member States is increasing, weakening the benefits of the Single Market.

Throughout the first three years of the revised Lisbon agenda, there has been an increasing focus by Member States on the mainstreaming of ICT policies, thanks to better recognition of the importance of ICTs as a source of innovation, competitiveness and growth. Countries increasingly recognise the need for greater cooperation within and among government organisations. The most frequent initiatives undertaken by Member States focus on the spread of eGovernment, broadband and digital skills in education. National plans are increasingly addressing a variety of ICT areas, often with dedicated strategies along the lines of the EU i2010 initiative, but commitments are uneven across the European Union.

In general terms there is a need to bring forward more innovative policies, speeding up action on the interoperability of cross-border eGovernment services, stimulating business take-up and including e-skills strategies within lifelong learning and skills policies. Measures should also take into account the important changes that ICT developments in network capacity, in wireless and mobile technologies as well as in collaborative applications are bringing to economies and societies.

The Lisbon reform process will be crucial, and needs to ensure progress while stimulating uniform development across Member States. The European Union is characterised by fragmentation for most of the information society indicators considered in this report.

All countries have strengths and weaknesses, with indicators both above and below the EU average. However, not all are equal and information society development is uneven. Three groups of countries can be distinguished:

- The most advanced countries: Denmark, Finland, Iceland, Netherlands, Norway, Sweden. Austria, Belgium, Germany, Luxembourg and the UK are close to this group.
- The least developed: Bulgaria, Cyprus, Greece, Poland and Romania. For these countries, more than 75% of the indicators are lower than the EU average.
- The remainder, with values above and below the EU average.

The pattern of information society development has remained largely unchanged: more advanced in the Nordic countries plus the Netherlands and the UK and lagging in many of the countries of eastern and central Europe and the Mediterranean. The accompanying Staff Working Document with country chapters sheds more light on individual performances.

74 COM(2007) 803.

i2010 — **List of actions**

Commission staff working document

volume **2**

SEC(2008) 470

http://ec.europe.eu/i2010

European Commission
Information Society and Media

1 i2010 — overview of key achievements 2005-2007

Nearly three years on from the launch of the i2010 strategy in June 2005, the list of achievements is long. Not only have all the major initiatives announced at the outset been launched, but new ones have also been added along the way.

1.1. Single Information Space

One of the first major i2010 initiatives was the proposal to modernise the TV Without Frontiers Directive. The new Audiovisual Media Services Directive has now been adopted by the Council and the European Parliament and is going to become law in 2009. The directive modernises the rules for Europe's audiovisual industry and provides a comprehensive legal framework covering all audiovisual media services — now including on-demand services.

The second highlight has been the package of proposals to reform EU telecom rules, which the Commission tabled at the end of 2007. The proposals update and improve the 2002 regulatory framework for electronic communications to meet the challenges of today's digital age. The reform represents a major push to remove the remaining bottlenecks in the EU telecoms markets, encourage investment in next-generation networks, improve the consistency of telecom rules and ensure more efficient management of spectrum across Europe.

Since the launch of i2010 the Commission has been very active in the field of spectrum management to ensure optimal use of this vital resource across the EU. The measures presented have ranged from a general reform of spectrum management, an RFID strategy and an approach to the digital dividend to specific harmonising decisions.

The Commission has also taken the initiative to promote online distribution of content so that EU citizens can enjoy easier and faster access to a variety of music, TV programmes, films or games through the Internet, mobile phones or other devices. The Film Online Charter, signed in Cannes in 2005, paved the way with a more comprehensive approach to creative content online, presented by the Commission in early 2008. Further recommendations have been announced.

In the summer of 2007, Europe's consumers were able to take advantage of cheaper roaming rates as the EU Roaming Regulation, proposed by the Commission just a year earlier, entered into force across the EU. Other notable initiatives included EU policy outlines for a secure information society in general and on fighting spam and cyber crime in particular, an agenda to promote mobile TV, and a plan for strengthening media literacy among the European public.

Finally, the i2010 High Level Group held a number of forward-looking debates on topics ranging from the challenges of digital convergence to next-generation networks and new perspectives for the role of the user and content in the digital age.

1.2. ICT research and innovation

European research and innovation are now receiving a major boost from the Seventh Framework Programme for Research (FP7), which runs from 2007 to 2013, with a

total of over €9 billion earmarked for ICTs. But innovation does not only arise from research — it is also increasingly driven by users of technologies and organisational change. The ICT policy support programme (ICT PSP) in the Competitiveness and Innovation Programme (CIP), also launched for the period 2007-2013, stimulates innovation and competitiveness by promoting wider uptake and best use of ICTs by citizens, governments and businesses, in particular SMEs. Moreover, at present some € 3.6 billion of the Structural Funds are foreseen for investment in ICTs (access, security, interoperability, risk-prevention, research, innovation, e-content) in the period 2007-2013.

In 2005-2006 the Commission helped establish new types of partnership — nine European Technology Platforms — in the field of ICTs to strengthen partnership with industry and achieve a critical mass of research in strategic fields. In 2007, it was proposed to turn two of the platforms into the first ever Europe-wide public-private R&D partnerships: the Commission presented two Joint Technology Initiatives (JTIs) on Embedded Computing Systems and Nanoelectronics. These JTIs will pool industry, Member State and Commission resources to conduct targeted research programmes.

In 2007 the Commission also proposed a long-term eSkills agenda as well as a new strategy for harnessing the innovative potential of public spending at the pre-commercial stage, which is risky but also important for research breakthroughs. Moreover, the Commission has been looking into the standardisation needs of the ICT sector.

The IDABC programme is promoting interoperability of eGovernment services at pan-European level, notably through the current revision of the European Interoperability Framework and the actions supporting interoperability for eIdentity and eSignatures. The European Commission itself is progressing on all the aims of its 2005 e-Commission initiative, on track to becoming an integrated government by 2010 (level 3 of e-government maturity on a scale from 1 to 4).

1.3. Inclusion, public services and quality of life

In 2005 and early 2006, Communications on bridging the broadband gap and on eAccessibility presented comprehensive approaches for these two areas. In mid-2006, the Riga ministerial conference also launched an ambitious agenda (Riga Ministerial Declaration) signed by 34 European countries to make the benefits of ICTs available to all EU citizens, with specific targets to be monitored and achieved by 2010.

In 2007 the Commission presented a major European eInclusion Initiative for 2008. Furthermore, one of the focus areas, ageing, will be addressed by the flagship initiative Ageing Well in the Information Society, which was also launched in that year. The initiative comprises an action plan and research funding for ambient assisted living.

Two other flagship initiatives have also been launched to illustrate the potential of ICTs to improve the quality of life in the areas of intelligent transport — the Intelligent Car — and making cultural heritage widely accessible — the European Digital Libraries project.

In the area of eGovernment, 2006 saw the Commission propose an action plan with, again, specific commitments to deliver tangible benefits to all Europeans by 2010. Furthermore, implementation of the 2004 Action Plan on eHealth, which aims to help the Member States reform their health systems and deploy innovative ICT solutions, is well on track.

The overall investment of the Structural Funds into innovative ICTs has more than doubled compared to the previous programming period (2000-2006) and is now expected to be around € 15.2 billion. Of this amount some € 8.8 billion will be invested in services and applications for citizens (e-health, e-government, e-learning, e-inclusion, etc.), services and applications for SMEs (e-commerce, education and training, networking, etc.) and other measures for improving access to and efficient use of ICTs by SMEs.

2 Future actions announced in the mid-term review

2.1. Single Information Space

Under the i2010 priority for creating a Single European Information Space, the Commission will monitor progress towards higher-speed networks by developing a broadband performance index and invite the Member States to set national targets for high-speed Internet usage to reach a 30% penetration rate among the EU population by 2010. The Commission also plans to propose a coherent long-term approach for the future of networks and the Internet and to issue a recommendation on Next Generation Access. New proposals will seek to facilitate the transition to IPv6, to promote the 'Internet of Things' (through a recommendation on RFID) and to ensure the high resilience of critical communication networks and information infrastructure (such as the Internet).

The adoption of the Commission's regulatory package for eCommunication by the Council and the European Parliament will be a highlight in 2008. By mid-2009 the European Electronic Communications Market Authority is to be created. The Commission will furthermore continue to promote more efficient, pan-European management of spectrum.

Universal service obligations will be assessed. To help users find their way in the new digital environment, a guide explaining their rights and obligations will be published. At the same time, the Commission will continue to work on the next phase of the revision of the consumer *acquis*. Moreover, the Commission will continue to support the protection of minors and the fight against illegal content through its newly proposed Safer Internet 2009-2013 programme. It will also assess challenges to privacy and trust in the information society (Communication) and address the interoperability and transparency of digital rights management (DRM) for consumers (Recommendation on content online). The Content Online Platform is to be launched.

2.2. ICT research and innovation

In the area of ICT research, innovation and take-up, many actions have already been launched that will yield benefits in the longer run. The Commission will continue to encourage the pooling of public and private R&D efforts in the Joint Technology Initiatives (JTIs), the Joint National Programmes, the ERA (European Research Area) coordination actions, and the European Technology Platforms (ETPs). The public sector will be encouraged to use its role as a first buyer to promote the public procurement of R&D services and innovative solutions. The Commission will address the role of e-Infrastructures in a changing and global research environment, and will issue a Communication on ICT research and innovation. The Commission will also adopt an action plan for e-signatures and e-authentication, propose improvements to ICT standardisation and implement a European electronic invoicing framework.

2.3. Inclusion, public services and quality of life

As regards social inclusion in the information society, 2008 will see the implementation of the newly launched European eInclusion Initiative. Support for the development of pan-European public services will continue through large-scale

pilot projects under the ICT Policy Support Programme (part of the CIP — Competitiveness and Innovation Programme). The Commission will furthermore implement the eHealth lead market initiative to exploit the full potential of eHealth for Europe. A Communication on ICTs and energy efficiency will be presented to help achieve Europe's sustainable growth objectives under the Lisbon agenda.

3 i2010 — List of actions June 2005 to March 2008[1]

Action and delivery date	Overview
0 — horizontal i2010 actions	
Communication 'i2010 — A European Information Society for growth and employment', COM(2005) 229, 01.06.2005	The Communication sets a framework for addressing the main challenges and developments in the information society and media sectors up to 2010. The i2010 initiative promotes an open and competitive digital economy and emphasises ICTs as a driver of inclusion and quality of life. i2010 rests on three pillars: (1) Creating the single European Information Space, which promotes an open and competitive internal market for information society and media services; (2) Increasing investment in innovation and research in ICTs; and (3) Fostering inclusion, better public services and quality of life through the use of ICTs.
i2010 High Level Conference, London, 06.09.2005	The i2010 conference, hosted by the UK Presidency, provided a key opportunity for governments and business from across the EU to contribute to the definition of the i2010 strategy for the EU up to 2010.
Establishment of the i2010 High Level Group, Commission Decision (2006/215/EC), 15.03.2006	The High Level Group of Member State representatives advises the Commission on the implementation, review and development of the i2010 strategy.
New benchmarking framework for i2010, 20.04.2006	Benchmarking is central to monitoring progress in achieving the i2010 priorities. Results are reviewed in the i2010 Annual Reports. The indicators are closely aligned with the Lisbon integrated guidelines relevant to ICTs.
Communication 'i2010 — First Annual Report on the European Information Society', COM(2006) 215, 19.05.2006	The Annual Report took stock of the achievements of the first year of implementation of the i2010 initiative and updated the i2010 actions for the period 2006-2007. The associated Commission staff working paper reviewed the i2010 key actions against the background of ICT developments in the EU.
i2010 High Level Conference, Helsinki, 27-28.09.2006	The 2006 high-level conference on i2010, 'i2010 — Towards a Ubiquitous European Information Society', was hosted by the Finnish Presidency. It examined the opportunities and challenges associated with a 'ubiquitous' information society, in which people's ways of life and work will be based on having ICT services available everywhere, at all times.
Fostering the competitiveness of Europe's ICT industry — EU ICT Task Force Report, 27.11.2006	The ICT Task Force recommends a focus on interoperability, developing digital and entrepreneurial skills, strengthening the internal market, reducing patent costs, and promotion of lead markets through public procurement. The task force brought together experts from industry and civil society to identify major obstacles to the competitiveness of the ICT sector.

1 This is a list of the actions launched, containing all items officially adopted before adoption of this Annual Report.

'The Challenges of Convergence' working paper of the i2010 High Level Group, 12.12.2006	The working paper, prepared together with the Member States in the i2010 High Level Group, highlights various technological, market and policy challenges posed by digital convergence. The paper concludes that the overall legal and regulatory framework is favourable for the further development of convergence, but there might be a need to look at emerging bottlenecks and new business models that change today's ways of delivering services and content to users.
Communication 'i2010 — Annual Information Society Report 2007', COM(2007) 146, 30.03.2007	The second Annual Report, published on 30 March 2007, reviews the Commission's and Member States' progress in implementing the i2010 agenda so far. It also updates the set of actions planned for 2007-2008. Finally, the report sets out the key policy issues for the future to be debated during the mid-term review of the i2010 strategy.
'User and consumer perspective in the context of convergence' working paper of the i2010 High Level Group, 20.04.2007	The issue paper identifies the gaps in the protection of users in the digital environment and reviews options for policy response.
'Content and Convergence' working paper of the i2010 Level Group, 20.04.2007	The issue paper outlines the main economic and cultural challenges arising from digital convergence and points to ways of addressing them that bring benefit in term of European competitiveness, cultural diversity and users' interests.

1 — A Single European Information Space

1.1 — Delivering services anywhere, anytime over high-speed seamless networks

Action 1: Review of the regulatory framework for electronic communications

Communication on market reviews under the EU Regulatory Framework, COM(2006) 28, 06.02.2006	The report reviews the electronic communications markets in 2005.
Communication 'European Electronic Communications Regulation and Markets 2005 (11th Report)' COM(2006) 68, 20.02.2006	The Commission publishes regular reports on the Member States' implementation of the EU framework for electronic communications. The 11th report looks at the latest market developments, mainly in broadband, mobile and fixed services, the regulatory environment and the consumer interest.
Communication on the outcome of the review of the scope of universal service, COM(2006) 163, 07.04.2006	The Commission reviewed the scope of universal service in the Universal Service Directive and concluded that it would not extend the scope of universal service to mobile telephony and broadband. However, a forward-looking policy discussion on this theme continues in the context of the general regulatory review of electronic communications in 2006.
Communication on the review of the EU Regulatory Framework for electronic communications networks and services, COM(2006) 334, 29.06.2006	Based on an analysis of the functioning of the regulatory framework and its impact, the Communication indicated possible changes and launched a public consultation on the proposals. At the same time, comments were invited on the draft second edition of the Commission Recommendation on Relevant Product and Service Markets. The two main proposals are to implement the Commission's policy approach to spectrum management and to reduce the burden of reviews of relevant markets by streamlining the procedures. Other changes proposed would strengthen the internal market, reinforce consumer interests, improve security and generally update the framework.
Proposal for a Regulation on roaming on public mobile networks within the Community, COM(2006) 382, 12.07.2006	The proposed Regulation does not fix an ideal price for roaming charges but applies a method that ensures, through price ceilings, that mobile roaming charges are not unjustifiably higher than those for domestic mobile phone use. The proposed regulation also enhances price transparency.
Communication 'European Electronic Communications Regulation and Markets 2006 (12th Report)' COM(2007) 155, 29.03.2007	The Commission report took a snapshot of Europe's telecom markets in 2006, worth almost €290 billion in revenues, just prior to the reform of the EU telecom rules. It included individual chapters covering the situation in each EU Member State.

Communication on market reviews under the EU Regulatory Framework (2nd report), COM(2007) 401, 11.07.2007	Although the EU's telecoms regulatory framework has led to significant benefits for citizens and enterprises alike, important challenges remain for national and European regulators, says the Commission report. It presents the results of 600 draft regulatory decisions sent to the Commission by National Regulatory Authorities. In a number of cases, the report found that the solutions imposed by national regulators to remedy a lack of competition vary considerably, leading to the risk of fragmenting the internal telecoms market to the detriment of consumers and pan-European operators.
Communication on Strengthening the Internal Market for Mobile TV. COM(2007) 409, 18.07.2007	The Commission has adopted a strategy favouring the take-up of mobile TV across the 27 EU Member States. The Commission urges Member States and industry to facilitate and accelerate the deployment of mobile TV across Europe and to encourage the use of DVB-H as the single European standard for mobile TV.
Proposals for a reform of the EU regulatory framework for electronic communications, 13.11.2007: Proposal for a Directive amending Directives 2002/21/EC on a common regulatory framework for electronic communications networks and services, 2002/19/EC on access to, and interconnection of, electronic communications networks and services, and 2002/20/EC on the authorisation of electronic communications networks and services, COM(2007) 697; Proposal for a Directive amending Directive 2002/22/EC on universal service and users' rights relating to electronic communications networks, Directive 2002/58/EC concerning the processing of personal data and the protection of privacy in the electronic communications sector and Regulation (EC) No 2006/2004 on consumer protection cooperation, COM(2007) 698; Proposal for a Regulation establishing the European Electronic Communications Market Authority, COM(2007) 699; Communication — Reaping the full benefits of the digital dividend in Europe: A common approach to the use of the spectrum released by the digital switchover, COM(2007) 700; Commission recommendation on relevant product and service markets, C(2007) 5406 rev 1; Report on the outcome of the Review of the regulatory framework and summary of the 2007 reform proposals, COM(2007) 696	The 'Telecoms Reform Package', which was presented by the Commission on 13 November 2007, will change the EU telecoms rules adopted in 2002. It is expected to become law by the end of 2009 and includes the following main features: — New consumer rights such as the right to switch telecoms operators within 1 day; the right to transparent and comparable price information; the possibility to call freephone numbers from abroad; and a more effective single European emergency number 112. — More consumer choice through more competition, especially by giving national telecoms regulators the new remedy of functional separation for dominant telecom operators. — More security in using communication networks, especially through new instruments to fight spam, viruses and other cyber attacks. — A 'New Deal' for radio spectrum — the lifeblood of all wireless communication services — to spur investment in new infrastructures and to ensure 'broadband access for everyone'. In rural areas of the EU, only 72% of the population on average have broadband access. The Commission wants to overcome this 'digital divide' by better managing radio spectrum and by making spectrum available for wireless broadband services in regions where building a new fibre infrastructure is too costly. The switchover from analogue to digital TV will free a substantial amount of radio spectrum (the 'digital dividend') that can be used for this purpose. — Better regulation in telecoms by deregulating those markets where EU-driven market-opening has already led to competition; this will allow the Commission and national regulators to focus on the main bottlenecks, such as the broadband market. — More independent watchdogs to guarantee fair regulation in the interest of consumers. Too often, telecoms regulators are still close to the dominant operator, which continues to be partly owned by the national government in many countries. The EU Telecoms Reform is designed to strengthen the independence of national telecoms watchdogs from operators and governments alike. To quickly and effectively implement the reform, the Commission proposes establishing a European Telecom Market Authority that will help ensure that important communication services (such as Internet broadband access, data roaming, mobile phone usage on planes and ships and cross-border business services) are regulated more consistently across the 27 EU Member States. The European Telecom Market Authority will more effectively combine the functions of the current European Regulators Group (ERG) and the current European Network and Information Security Agency (ENISA). To become law, the Commission proposals need to be approved by the European Parliament and the EU Council of Ministers.
Communication 'Progress report on the single European electronic communications market 2007 (13th Report)' COM(2008) 153, 19.03.2008	The progress report presented a snapshot of Europe's Single Telecoms Market as of December 2007, based on facts and figures from national telecoms regulators and market players.

Action 2: Making spectrum management more efficient

Communication on a forward-looking radio spectrum policy for the European Union — Second annual report, COM(2005) 411, 06.09.2005	The Spectrum Policy Report identified policy priorities for more flexible spectrum management and an action plan for their implementation.
Communication on a market-based approach to spectrum management in the European Union, COM(2005) 400, 14.09.2005	The Communication paved the way for the coordinated introduction of secondary trading of radio frequencies in the Union by 2010.
Communication on EU spectrum policy priorities for the digital switchover, COM(2005) 461, 29.09.2005	The Communication provided guidance for international spectrum negotiations in the ITU Regional Radiocommunications Conference (RRC-06) with particular reference to the spectrum implications of the digital switchover.
Commission Decision 2005/513/EC on the harmonised use of radio spectrum in the 5 GHz frequency band for the implementation of Wireless Access Systems including Radio Local Area Networks (WAS/RLANs), 11.07.2005	This decision makes available in all Member States a substantial amount of radio spectrum for radio local area networks (RLANs) — commonly known as 'Wi-Fi' — to provide access on the move to the Internet and private networks.
Commission Decision 2005/928/EC on the harmonisation of the 169.4-169.8125 MHz frequency band in the Community (frequency band originally designated for the ERMES paging system), 20.12.2005	Spectrum bands reserved for paging systems no longer in use were reallocated in the whole EU to special needs applications such as hearing aids and emergency alarms.
Commission Decisions: 2006/771/EC on the harmonisation of the radio spectrum for use by short-range devices, 09.11.2006; and 2006/804/EC on the harmonisation of the radio spectrum for radio frequency identification (RFID) devices operating in the ultra high frequency (UHF) band, 23.11.2006	The two Decisions, applicable throughout the EU, specify harmonised conditions for the use of radio spectrum for a large range of low-power short-range radio transmitters. Thanks to these Decisions, consumers will not need to worry whether a wireless product bought in one Member State will work in another. One harmonisation measure covers RFIDs in the UHF band and the other addresses certain equipment categories of relevance today, but also has a built-in mechanism to extend it to new devices.
Communication on rapid access to spectrum for wireless electronic communications services through more flexibility, COM(2007) 50, 08.02.2007	The aim of this Communication is to set out the practical steps necessary from now until 2010 to pave the way towards more flexible spectrum management in bands used for electronic communications services with individual rights of use.
Commission Decision 2007/98/EC on the harmonised use of radio spectrum in the 2 GHz frequency bands for the implementation of systems providing mobile satellite services, 14.02.2007	This Decision is an important step in facilitating the introduction of new and innovative Mobile Satellite Service systems providing services such as satellite data casting or multimedia broadcasting (including mobile TV) via a coordinated EU approach.
Commission Decision on allowing the use of the radio spectrum for equipment using ultra-wideband technology in a harmonised manner in the Community, 21.02.2007	This harmonising decision outlines mandatory conditions for using ultra-wideband (UWB) technology in new-generation wireless devices (such as laptops, mobile phones, digital cameras) in the EU. It allows innovators to use this new technology throughout the EU without interference with other wireless users. With UWB, many electronic devices so far linked by cable will have a wireless alternative offering the same data rates.
Communication on Radio Frequency Identification (RFID) in Europe: Steps towards a policy framework, COM(2007) 96, 13.3.2007	From today's simple radio tags to tomorrow's intelligent and networked systems, RFID applications will create many opportunities for business and society. But the more intensive and extensive use of RFID also raises questions in the areas of privacy, security, technological reliability and international compatibility. The Communication on RFID identifies RFID-related issues of high importance for Europe, together with a plan for future action at European level.

Commission Decision 2007/344/EC on harmonised availability of information regarding spectrum use within the Community, 16.05.2007	Radio spectrum users will soon benefit from greater clarity on what spectrum is available and how this may be used across Europe. The Decision defines a common format and level of detail for information that Member States should provide. This common approach will permit the establishment of a single information point containing comparable data.
Communication 'The ITU World Radio-communication Conference 2007 (WRC-07)', COM(2007) 371, 02.07.2007	The Communication outlines the EU's positions on what needs to be achieved at the 2007 World Radiocommunication Conference (WRC-07) of the International Telecommunication Union (ITU) in areas such as future terrestrial mobile systems, Earth exploration, digital radio broadcasting, and aviation applications.
Proposal for a Directive repealing Council Directive 87/372/EEC on the frequency bands to be reserved for the coordinated introduction of public pan-European cellular digital land-based mobile communications in the Community COM(2007) 367, 25.07.2007	The Commission has proposed measures to make it easier and more lucrative for mobile operators in Europe to offer and develop innovative wireless technologies. By opening radio spectrum for advanced mobile data and multimedia services (such as 3G services that allow video streaming and fast downloads on a mobile handset), the Commission proposals, if they become law, will increase the number and choice of wireless services available, and will expand their geographic coverage to the benefit of all European citizens. The new EU measures will also reduce network deployment costs for Europe's wireless communications industry.
Proposal for a Decision on the selection and authorisation of systems providing mobile satellite services (MSS), COM(2007) 480, 22.08.2007	If adopted by the European Parliament and the Council, this new selection mechanism will allow innovative services, such as mobile TV, broadband data and emergency communications, to develop smoothly throughout Europe from 2009.
Communication 'Reaping the full benefits of the digital dividend in Europe: A common approach to the use of the spectrum released by the digital switchover', COM(2007) 700, 13.11.2007	(See Action 1, Proposals for a reform of the EU regulatory framework for electronic communications)

Action 3: A consistent internal market framework promoting the development of high quality and innovative information society and media services

Commission Recommendation on collective cross-border management of copyright and related rights for legitimate online music services (2005/737/EC), 18.10.2005	The Recommendation puts forward measures for improving EU-wide licensing of copyright for online services. The development of EU-wide copyright licenses should allow new online music services to develop their full potential.
Proposal for a Directive on payment services in the internal market, COM(2005) 603, 01.12.2005	The proposed Directive brings down existing legal barriers in order to create a 'Single Payments Area' in the EU. The aim is to make cross-border payments — by credit card, debit card, electronic bank transfer, direct debit or any other means — as easy, cheap and secure as 'national' payments within one Member State.
Legislative proposal for an Audiovisual Media Services Directive (revision of the 'Television Without Frontiers' Directive), COM(2005) 646, 13.12.2005	The proposal aims to create a single framework for all types of audiovisual media services, irrespective of the technology used to transmit or receive them. The objective is to create a level playing field for the different providers of audiovisual content and provide operators of non-linear audiovisual media services with the legal certainty necessary to offer their services on a pan-European basis. The proposal is on track for adoption by the European Parliament and the Council.
Commission Decision on re-use of Commission information (2006/291/EC), 07.04.2006	The Decision determines the conditions for the re-use of documents held by the Commission or on its behalf by the Office for Official Publications of the European Communities with the aim of facilitating wider re-use of this information.
European Charter for the Development and the Take-up of Film Online, 23.05.2006	The Charter identifies commendable practices for bringing film online via legitimate services and in a consumer-friendly way. It was initiated by the Commission and agreed by business leaders at the Cannes Film Festival in 2006. It aims to be the point of reference for the film and content industry, Internet service providers and telecom operators.

Adoption of the MEDIA 2007 Programme, Decision 1718/2006/EC, 15.11.2006	Launched on 11.02.2007, the MEDIA 2007 programme will provide a €755 million boost to Europe's film industry over the next seven years. Almost 65% of the budget will help broaden the circulation of European works to other countries in Europe and worldwide. MEDIA 2007 provides easier access to finance and promotes increased use of digital technologies.
Adoption of the eContentplus 2006 Work Programme and call for proposals	The work programme set the following objectives for 2006: geographic information, educational content, digital libraries (cultural and scientific/scholarly content), and reinforcing cooperation between digital content stakeholders.
Commission staff working paper on media pluralism, SEC(2007) 32, 16.01.2007	Responding to political concerns about media concentration and its possible effects on pluralism and freedom of expression, the Commission presented a three-step approach to advancing the debate on media pluralism in the EU.
Green Paper on the Review of the Consumer Acquis, COM(2006) 744, 08.02.2007	The Green Paper launched a major new drive to adapt core EU consumer rules to the challenges of the fast-changing digital world. The paper identified a number of problems with the current legislation in the area of consumer protection, presented the main options for reform and initiated a public consultation.
Communication 'A single market for citizens — Interim Report to the 2007 Spring European Council', COM(2007) 60, 21.02.2007	The report sketched out a new vision for the single market of the future. It was followed later in 2007 by a full review of the single market (see below).
Single market review package: Communication on a single market for 21st century Europe, COM(2007) 724 and associated documents, 20.11.2007	The Communication concludes the review initiated in 2006 and transforms the 'vision paper' of February 2007 into an operational set of initiatives to re-position the single market. Among the many measures announced, the Commission intends to propose a European e-Invoicing Framework, an action plan on e-authentication and e-signatures, a standardisation strategy, as well as an initiative on universal service in support of an Information Society for all, in line with the new reform proposals for EU telecom rules.
Communication on a European approach to media literacy in the digital environment, COM(2007) 833, 20.12.2007	The Communication is the first EU-level policy document on media literacy — the ability of people to critically analyse what they find in the media and to make more informed choices. The document focuses on: 1) media literacy for commercial communication, covering issues related to advertising, 2) media literacy for audiovisual works, which is in part about raising awareness of European film and enhancing creativity skills, 3) and online media literacy, which, for example, will give citizens a better understanding of how Google and other Internet search engines work.
Communication on creative content online in the Single Market, COM(2007) 836, 03.01.2008	The Communication launched actions to support the development of innovative business models and the cross-border delivery of diverse online creative content services. The Commission has identified four main, horizontal challenges that merit further action at EU level: 1) availability of creative content, 2) multi-territory licensing for creative content, 3) interoperability and transparency of Digital Rights Management systems (DRMs) and 4) legal offers and piracy. The Communication opened a public consultation in order to prepare, by mid-2008, an EU Recommendation on Creative Content Online.
1.2 — Increasing security of networks	
Action 4: Strategy for a secure European Information Society — increasing trust and confidence	
Report on the operation of the Directive on electronic signatures, COM(2006) 120, 15.03.2006	The report reviews the operation of the Directive on electronic signatures. Most applications are found in the field of e-banking and e-government but the use of qualified electronic signatures has been much lower than expected.
Communication 'A strategy for a Secure Information Society — Dialogue, partnership and empowerment' COM(2006) 251, 31.05.2006	The strategy builds a framework and develops synergies among the various policy initiatives for network and information security. It calls for a structured process of consultation and dialogue with relevant stakeholders, including public administrations, the private sector, individual users and the European Network and Information Security Agency (ENISA).

Communication on fighting spam, spyware and malicious software, COM(2006) 688, 15.11.2006	Despite existing EU legislation outlawing spam, Europe continues to suffer from illegal online activities both from inside the EU and from third countries. The Commission stresses that national authorities must step up their prosecution of such activities. The Communication takes stock of the efforts made so far to fight these threats and identifies further action that can be taken.
Communication concerning the final evaluation of the Safer Internet Action Plan (2003-2004), COM(2006) 663, 6.11.2006	The final evaluation of the first generation of Safer Internet activities is a necessary step for further policy development, including the presentation of a new programme in 2008.
Communication on the implementation of the Safer Internet plus programme (2005-2008) COM(2006) 661, 6.11.2006	Assessment of the first phase of operation of the programme provides the basis for defining the complete financial framework for the Programme.
Adoption of the Safer Internet plus 2006 Work Programme and call for proposals	The 2006 call addressed all action lines under the Programme. For actions to fight illegal content and raise awareness, the call invited proposals from Member States where no hotline or awareness nodes had previously been established.
European Programme for Critical Infrastructure Protection (EPCIP), COM(2006) 786, 12.12.2006	Critical infrastructure can be damaged, destroyed or disrupted by deliberate acts of terrorism, natural disasters, negligence, accidents, as well as computer hacking, criminal activity and malicious behaviour. The Commission presented a package of new measures to improve the protection of critical infrastructure in Europe, including critical ICT infrastructure.
Decision C(2007) 249 on reserving the national numbering range beginning with '116' for harmonised numbers for harmonised services of social value, 12.02.2007	The Commission adopted a Decision reserving the 116 000 telephone number in all Member States as a hotline for reporting missing children. Calling 116 000 will be free of charge and the number was to be operational throughout Europe by the summer of 2007. It is up to the Member States to select an association or authority to manage this service. All other numbers beginning with 116 are also reserved for social services in Europe.
Communication 'Promoting Data Protection by Privacy Enhancing Technologies (PETs)' COM(2007) 228, 02.05.2007	The Communication identifies the benefits of Privacy Enhancing Technologies (PETs) and lays down the Commission's objectives in this field. Those objectives are to be achieved through a number of specific actions supporting the development of PETs and their use by data controllers and consumers.
Communication 'Towards a general policy on the fight against cyber crime', COM(2007) 267, 22.05.2007	The Commission has outlined actions to improve cooperation between law enforcement authorities and between law enforcement and private sector operators in fighting cyber crime. The actions will complement other actions taken at national, European and international level.
Proposal for Decision establishing a multiannual Community programme on protecting children using the Internet and other communication technologies, COM(2008) 106, 27.02.2008	Safer Internet 2009-2013 builds upon the successful Safer Internet plus programme and will have a budget of €55 million. Encompassing recent Web 2.0 communications services such as social networking, the new programme will fight not only illegal content but also harmful conduct such as grooming and bullying.

2 — Innovation and investment in research

2.1 — Promoting research and innovation

Action 5: Strengthening European research through the Framework Programmes

Launch of the European Technology Platforms (ETPs), 2005-2006	European Technology Platforms help industrial and academic research communities in specific technology fields to coordinate their research and tailor it to a common 'strategic research agenda'. Nine Platforms have been launched in ICT areas: nanoelectronics (ENIAC), embedded systems (ARTEMIS), mobile and wireless communications (eMobility), networked electronic media (NEM), networked software and services (NESSI), robotics (EUROP), photonics (PHOTONICS21), satellite communications (ISI) and smart systems integration (EPoSS).

Adoption of Decisions establishing the 7th Framework Programme for Research (2007-2013), Decision No 1982/2006/EC, 18.12.2006, and others (2006/971/EC, 19.12.2006 — Specific Programme 'Cooperation')	The Seventh Framework Programme (FP7) bundles all research-related EU initiatives together under a common roof and has a crucial role to play in reaching the goals of growth, competitiveness and employment. The broad objectives of FP7 are grouped into four categories: Cooperation, Ideas, People and Capacities. The ICT priority theme is addressed mainly in the 'Cooperation' Specific Programme.
Adoption of the ICT Work Programme 2007-2008 under the 7th Framework Programme for Research (FP7)	The Work Programme for the ICT theme of the FP7 Specific Programme 'Cooperation' defines the priorities and criteria for the calls for proposals to be launched in 2007. It addresses seven 'challenges' of strategic interest to European society (1. Pervasive and trusted network and service infrastructures; 2. Cognitive systems, interaction and robotics; 3. Components, systems and engineering; 4. Digital libraries and content; 5. Sustainable and personalised healthcare; 6. Mobility, environmental sustainability and energy efficiency; 7. Independent living and inclusion), along with research into 'future and emerging technologies' and support for horizontal actions, such as international cooperation. Furthermore, research e-Infrastructures will be supported through the Research Infrastructures Work Programme for the 'Capacities' programme.
Proposal for a Council Regulation on the establishment of the 'ARTEMIS Joint Undertaking' to implement a Joint Technology Initiative in Embedded Computing Systems, COM(2007) 243, 15.05.2007	The Commission has proposed to launch a new kind of Europe-wide public-private R&D partnership — Joint Technology Initiatives (JTIs) — in embedded computing systems. JTIs will pool industry, Member State and Commission resources to conduct targeted research programmes. They will move away from the traditional case-by-case public research funding approach towards large-scale research programmes with common strategic research targets.
Proposal for a Council Regulation Setting up the 'ENIAC Joint Undertaking', COM(2007) 356, 22.06.2007	The second Commission proposal for a Joint Technology Initiative concerns nanoelectronics. This Europe-wide public-private research partnership, called ENIAC, is to have a €3bn budget from industry, the Member States and the Commission, and aims to create a strong nanoelectronics research and manufacturing sector in Europe. The ultimate aim is to generate innovative products with in-built intelligence in numerous areas such as the consumer electronics, automotive, healthcare and environmental management sectors.

Action 6: Making innovation and research policies more efficient

Action Plan for European Standardisation, April 2006	This four-year rolling action plan outlines the main actions to be implemented, including in the area of ICTs, and defines a timeframe for carrying out these actions, subject to a review after 2 years.
Communication 'Putting knowledge into practice: a broad-based innovation strategy for the EU', COM(2006) 502, 13.09.2006	This 10-point programme urges action at national and European levels to foster innovation in the EU economy. The Commission outlines the concept of lead markets where public authorities facilitate industry-led innovation by creating conditions for the successful market uptake of innovative products and services in key areas of societal demands.
Communication to the European Council informal meeting in Lahti: An innovation-friendly, modern Europe. COM(2006) 589, 12.10.2006	The document focuses on several specific measures that could boost Europe's innovative capacity in a relatively short period of time. The proposed measures concern the establishment of European leadership in future strategic technologies, forging stronger links between universities, research and business, as well as improving the framework conditions for R&D investment.
Launch of a European Network of Living Labs, 20.11.2006	The European Network of Living Labs creates a platform where firms, public authorities and citizens can work together on developing and testing new technologies, business models and services in real-life contexts. The ultimate aim is to set up a new European Innovation Infrastructure where users play an active role in innovation.
Preparation of the ICT PSP Work Programme 2007	The ICT Policy Support Programme (ICT PSP) in the Competitiveness and Innovation Programme (CIP) will support the aims of the i2010 strategy, building on the previous e-TEN, Modinis and e-Content programmes. In 2007 the programme will focus on three main themes: efficient and interoperable eGovernment services; ICTs for accessibility, ageing and social integration; and ICTs for sustainable and interoperable health services.

Communication on pre-commercial procurement: driving innovation to ensure sustainable high quality public services in Europe, COM(2007) 799, 14.12.2007	The Communication proposes a new strategy for harnessing the innovative potential of public spending in Europe in the field of Research and Development (R&D). Europe could do substantially more at the pre-commercial stage, where products and services are not yet ripe for the market, and where investment is particularly risk-prone but crucial for research breakthroughs. For the Commission, such pre-commercial procurement could tap unused potential especially in high-tech areas, such as research into information and communication technologies for health care and medicine. The strategy launches a debate with the 27 EU Member States on where and how to focus the pre-commercial procurement of R&D.
Communication 'A lead market initiative for Europe', COM(2007) 860 21.12.2007	Europe can develop innovation-friendly markets in a more targeted way, considerably facilitating the marketing of innovations. That is what the Lead Markets Initiative seeks to do. eHealth is one of the six markets identified for the initial stage of the initiative. The Commission presents ambitious action plans for these markets to rapidly secure tangible advantages for Europe's economy and consumers.

2.2 — Promoting ICT innovation and adoption for competitiveness and employment

Action 7: Promoting eBusiness solutions

Establishment of the Enterprise Interoperability Centre (EIC), April 2006	The EIC provides a platform for companies to discuss interoperability issues in their business relationships, with the focus on business-to-business processes, taking into account the various messaging standards available in each industry.

3 — Inclusion, better public services and quality of life

3.1 — Facilitating wider inclusion, accessibility and digital literacy

Action 8: Further development of eAccessibility and a comprehensive eInclusion strategy

Communication on eAccessibility COM(2005) 425, 13.09.2005	The Communication calls upon the Member States to do more to promote eAccessibility and to encourage take-up by industry. While continuing to support measures such as standardisation, Design for All, web accessibility and research, the Commission also proposes: to improve the consistency of accessibility requirements in public procurement; to explore certification schemes for accessible products and services; and to make better use of the 'eAccessibility potential' of existing legislation.
Communication 'Bridging the broadband gap', COM(2006) 129, 20.03.2006	The Communication focuses on the lack of adequate broadband services in the less developed areas of the Union. It assesses the instruments available at EU level to address this issue and proposes two main strands of action: the strengthening of national broadband strategies to set clear targets and reflect regional needs; and better exchange of best practice.
Riga Ministerial Declaration on eInclusion, 11.06.2006	The ministerial conference in Riga launched preparations for the 2008 European Initiative on eInclusion. The concluding declaration set priorities and commitments for addressing the needs of older people, reducing geographical digital divides, enhancing eAccessibility, improving digital literacy and promoting cultural diversity as well as inclusive eGovernment.
Recommendation on key competences for lifelong learning, (2006/962/EC), 18.12.2006	Every citizen must be equipped with the skills needed to live and work in the new information society. The European Parliament and the Council adopted the Commission proposal for a Recommendation providing a European reference tool on key competences, including digital competence, and on access to these competences through lifelong learning.
Communication 'E-skills for the 21st century: fostering competitiveness, growth and jobs', COM(2007) 496, 07.09.2007	Recent surveys indicate that Europe may face severe e-skills shortages in the coming years. At the same time, e-skills are becoming central to productivity, employability and the response to global challenges. The Commission has therefore proposed a long-term e-skills agenda and a set of actions at EU level.

Communication 'European i2010 initiative on e-Inclusion — To be part of the information society', COM(2007) 694, 08.11.2007	Despite technological progress and enhanced competition, more than one in three Europeans are still excluded from the full benefits of the digital society. To address this, the Commission sets out a European initiative to: 1) enable everyone to take part in the information society by bridging the accessibility, broadband and competence gaps; 2) boost the effective participation of those at risk of exclusion, and improve their quality of life; and 3) integrate e-Inclusion actions in Europe, so as to maximise their lasting impact. Among other things, the Communication announces a 2008 awareness-raising campaign 'e-Inclusion, be part of it!' and a ministerial conference at the end of that year.

3.2 — Providing better public services

Action 9: Promoting ICT-enabled public services (eGovernment and eHealth)

Commission decision on e-Commission 2006-2010: enabling efficiency and transparency, C(2005) 4473, 23.11.2005	The Commission intends to lead by example by applying eGovernment to its own administration. The *e*-Commission initiative aims to deliver better-quality and more transparent services, guaranteeing security of information including the protection of personal data.
Communication on interoperability for pan-European eGovernment services, COM(2006) 45, 13.02.2006	Interoperability in eGovernment requires that the multiple layers of government at national, regional and local levels are able to 'talk to each other'. The Communication calls upon the Member States and industry to collaborate to make such interoperability happen. More concrete steps follow in the eGovernment Action Plan.
Communication on i2010 eGovernment Action Plan: Accelerating eGovernment in Europe for the Benefit of All, COM(2006) 173, 25.04.2006	The eGovernment Action Plan addresses five priority areas, with ambitious objectives to be reached by 2010: 1) ensuring all citizens have access to a wide range of technologies; 2) raising administrative efficiency; 3) implementing e-Procurement; 4) ensuring secure access to services across the EU; and 5) strengthening participation and democratic decision-making.
EU Health Portal 'Health-EU', launched 10.05.2006	Health-EU provides a single point of entry where citizens, administrations and specialists can find a wealth of health-related information and data from EU, national and sub-national levels. It is accessible at http://health.europa.eu.

Action 10: Ageing Well in the Information Society — *flagship initiative in preparation*

Communication 'Ageing well in the Information Society — An i2010 Initiative — Action Plan on Information and Communication Technologies and Ageing', COM(2007) 332, 14.06.2007 Proposal for a Decision on participation by the Community in a research and development programme aimed at enhancing the quality of life of older people through the use of new Information and Communication Technologies (ICT), COM(2007) 329, 14.06.2007	Responding to the needs of Europe's growing ageing population, the Commission adopted a European Action Plan for 'Ageing Well in the Information Society'. The action plan aims to help overcome technical and regulatory barriers to market development, to help raise awareness and share best practice, as well as to accelerate take-up through, for example, pilot projects and a European award scheme for smart homes and independent living applications. In particular, three areas of user needs are to be addressed: ageing well at work or 'active ageing at work', ageing well in the community, as well as ageing well at home. The action plan is accompanied by a new joint European research programme raising to over €1bn the investment on research into ICTs to improve the lives of older people.

Action 11: Intelligent Car

Second eSafety Communication 'Bringing eCall to Citizens', COM(2005) 431, 14.09.2005	eCall is an in-vehicle safety system: when a car senses a major impact in an accident, its eCall device automatically calls the nearest emergency centre using 112. In response to the slow progress of eCall in the Member States, the Commission urges the national and regional governments to do more. The Communication provides a roadmap for full-scale roll-out of eCall.
Communication on the Intelligent Car Initiative 'Raising Awareness of ICT for Smarter, Safer and Cleaner Vehicles', COM(2006) 59, 15.02.2006	The Commission's Intelligent Car Initiative is a comprehensive initiative for smarter, safer and cleaner vehicles. The long-term objective is a situation where cars no longer crash and traffic congestion is reduced. The Communication presents a policy framework for action, comprising coordination of relevant stakeholders (eSafety Forum), ICT-based research and development, as well as awareness raising and stimulation of user demand.

Third eSafety Communication 'Bringing eCall back on track — Action Plan', COM(2006) 723, 23.11.2006	An urgent set of actions to restart moves to roll out emergency call (eCall) technology for cars in Europe has been proposed by the Commission. Member States have been given clear tasks with deadlines for solving the remaining issues and proceeding with the necessary 112, E112 and eCall infrastructures. Industry is asked to renew its commitment to eCall.
Commission Recommendation on safe and efficient in-vehicle information and communication systems: update of the European Statement of Principles on human machine interface (2007/78/EC), 22.12.2006	The Commission has updated the Recommendation on human-machine interfaces in vehicles. This update responds to the increased presence of portable devices in cars such as mobile telephones, PDAs (Personal Digital Assistants) or laptops. The objective is to make the design and installation of these systems safer.
Communication 'Towards Europe-wide safer, cleaner and efficient mobility: the first Intelligent Car report', COM(2007) 541, 17.09.2007	The Commission has outlined new plans to accelerate the drive for safer, cleaner and smarter cars. The Commission will start negotiations with European and Asian automotive industry associations later this year to reach an agreement on offering the pan-European in-vehicle emergency call system (eCall) as a standard option in all new cars from 2010. It will also further promote the take-up of other life-saving technologies and investigate how technology can help make cars greener and smarter.
Action 12: Digital Libraries	
Communication on digital libraries, COM(2005) 465, 30.09.2005	The Commission is promoting and coordinating work to build a European Digital Library — a common multilingual access point to Europe's cultural heritage. The Communication proposes a first set of actions in the areas of: digitisation of content stored in traditional formats; online accessibility of this content; and digital preservation. The aim is to make two million books, films, photographs, manuscripts, and other cultural works accessible through the European Digital Library by 2008. This figure will grow to at least six million by 2010.
Commission Decision setting up a High Level Expert Group on digital libraries, (2006/178/EC), 28.02.2006	This advisory group also provides a forum for discussion with stakeholders. Its first contribution on the management of copyright addresses the practical problems of dealing with orphan and out-of-print works and digital preservation.
Commission Recommendation on the digitisation and online accessibility of cultural material and digital preservation, (2006/585/EC), 24.08.2006	In the Recommendation, the Commission urges Member States to tackle three main areas: the digitisation of cultural material, its online accessibility and digital preservation. The institutions or Member States themselves will be responsible for the selection of the material to be digitised.
Communication on scientific information in the digital age: access, dissemination and preservation, COM(2007) 56, 15.02.2007	The Communication examines how new digital technologies can be better used to increase access to research publications and data. The Commission thereby launches an EU framework to support new ways of promoting better access to scientific information online and to preserve research results digitally for future generations.
Commission Decision setting up the Member States' Expert Group on Digitisation and Digital Preservation (2007/320/EC), 22.03.2007	The group will monitor progress and assess the implementation of the Recommendation on the digitisation and online accessibility of cultural material and digital preservation, and the Council Conclusions on this topic. It will also be a forum for sharing strategies and best practice.
Action 13: ICTs for sustainable growth — *flagship initiative in preparation*	

4 i2010 — planned actions

1 — A Single European Information Space	
Develop a broadband performance index	The Commission will monitor the development of the EU Internet economy through a broadband performance index to be launched in 2008.
Communication on the future of networks and the Internet	The Communication will address the policy implications of current developments in the Internet and e-communications to ensure that business and citizens in the EU can benefit from top-class communications networks and services in the future.
Recommendation concerning Next Generation Access	The Commission will enhance legal certainty for stakeholders by issuing, by summer 2008, guidance on the application of the regulatory framework to aspects of new fibre investment in the local access network.
Recommendation on RFID	The Recommendation will aim to promote the 'Internet of Things' and in particular will address privacy and security issues.
Communication on Critical Infrastructure Protection — CIIP	The aim is to put into operation preventive, detection, emergency and recovery measures to ensure high level of resilience of critical communication networks and information infrastructure (such as the Internet) and continuity of services.
Communication on IPv6	The current generation of the Internet will "run out of space" in the near future (2010/2011) if IPv6 — the 6th version of the Internet Protocol — is not adopted around the world. IPv6 will also make the Internet more stable, efficient, powerful, secure and private, and so is crucial for the development of the Information Society. The Commission will propose a set of actions to facilitate the transition to IPv6.
Support the adoption of the regulatory package for e-Communications and in particular the creation of the EECMA	See the Commission proposals summarised in part 3: i2010 list of actions, section 1.1 — delivering services anywhere, anytime over high-speed seamless networks, action 1: review of the regulatory framework for electronic communications. Among others, the Commission proposed to set up a European Electronic Communications Market Authority (EECMA).
Make spectrum management more efficient	Make spectrum management more efficient by facilitating the harmonisation and trading of the pan-European part of frequencies.
Report on universal service obligations	The Commission is required to review in 2008 the scope of the universal service provisions in the current e-communications framework adopted in 2002 and, where appropriate, to come forward with proposals.

Guide on users' rights and obligations in the digital environment	Market players are not sufficiently aware of their rights and obligations in the new digital environment. The Commission will prepare a guide explaining the rights and obligations of information society players, including consumers, under existing Community legislation. This exercise will not cover consumer contract legislation, which is currently under review (see Green Paper on the consumer acquis), nor question the existing legislation.
Launch next phase of the consumer acquis review — Framework Directive on Consumer Contractual Rights	The results of the public consultation on the consumer acquis green paper have shown a strong need for a revision of the existing EU consumer protection legislation. Subject to the result of the impact assessment, the Commission intends to table a proposal for a Framework Directive on Consumer Contractual Rights in the second half of 2008. The Framework Directive will aim at increasing consumer and business confidence in cross-border transactions (including transactions concluded in the context of eCommerce) by simplifying and improving the consumer regulatory framework.
Communication on privacy and trust in the ubiquitous information society	While creating huge benefits, new ICT applications and services may also pose new threats to the privacy of citizens, when they leave data traces of their many daily actions without citizens even being aware or able to control the process. The Communication will analyse the challenges to privacy and trust, and assess options for policy response, including non-legislative and legislative measures.
Launch of Content Online Platform	The Platform, as announced in the Communication on creative content online, will provide a stakeholders' discussion and cooperation forum to initiate work on forthcoming challenges in this area.
Recommendation on content online	Building upon the Communication on creative content online (see Section 1.1. Action 3), the recommendation will address in particular the interoperability and transparency of DRMs for consumers.
2 — Innovation and investment in research	
Improvements to the EU ICT standardisation system	The Commission has been working on improving ICT standardisation and will come forward with a proposal by the end of 2008.
Action plan to further promote implementation of mutually recognised and interoperable electronic signatures and e-authentication	As announced in the 2007 Single Market Review, the Commission will present in 2008 a specific Action Plan to further promote the implementation of mutually recognised and interoperable electronic signatures and e-authentication (electronic identity) among the Member States, thereby facilitating the provision of cross-border public services.
European electronic invoicing framework	The informal Task Force on eInvoicing concluded (in the June 2007 report) that the Commission should set up an Expert Group to develop a European eInvoicing Framework (EEI framework) and propose solutions to the existing legal barriers, trust and operational risk barriers and standardisation barriers.
Support for Joint Technology Initiatives, European Technology Platforms, Joint National Programmes and ERA coordination actions	Continuation and implementation of initiatives to bring together a critical mass in large-scale, strategic common initiatives. The role of the European Technology Platforms is to be extended to areas such as standards, infrastructures and skills. The Joint Technology Initiatives are to be launched in 2008.
Promoting the role of the public sector as first buyer of R&D services and innovative solutions	Further to the strategy for the pre-commercial procurement of R&D, which was published in December 2007 and launched a public debate, the Commission will propose concrete measures on where and how to best channel such activities.
Communication on ICT research and innovation	The initiative will propose sets of actions in areas of public interest to address specific key societal challenges: research and development, regulation, standardisation and implementation of innovative solutions.
Communication on e-Infrastructures in a changing and global research environment	The document will aim to promote more research coordination and new means of undertaking research supported by powerful computing and communication tools to improve the efficiency and quality of research.

3 — Inclusion, better public services and quality of life	
Develop pan-European public services through large-scale pilots	Complementing the work on eID and eProcurement, which will start in 2008, the ICT Policy Support Programme will also support the implementation of the Services Directive and the reduction of the administrative burden.
Implementation of the eHealth lead market initiative	As announced in the Communication on lead markets (see above List of launched actions, section 3.2), the eHealth lead market initiative will aim to develop a European market for innovative eHealth technologies and to combat fragmentation in the way healthcare is delivered in the different Member States.
Communication 'Addressing the challenge of Energy Efficiency through Information and Communication Technologies'	The Communication will explore synergies between ICTs, which are part of the problem but also part of the solution to energy efficiency, in a number of promising sectors, such as smart power grids, energy-smart buildings and smart lighting.
Implementation of the eInclusion Initiative	As announced in the Communication 'European i2010 initiative on e-Inclusion — To be part of the information society', the initiative will include proposals on eAccessibility, implementation of the flagship initiative on Ageing Well in the Information Society, a review of digital literacy policies, an awareness-raising campaign and a ministerial conference at the end of 2008.

ICT **Country Profiles**

Commission staff working document

volume **3**

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Information Society and Media

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Introduction

This annex presents detailed results for 52 benchmarking indicators for which up-to-date data is available. Profiles are provided for each Member State plus Norway and Iceland[1].

The indicators were defined by the Commission in co-operation with Member States and were set out in the i2010 Benchmarking Framework[2] endorsed by the i2010 High Level Group in April 2006. The main sources of data are the Community Surveys of Households and Individuals and of Enterprises undertaken by the National Statistical Offices and Eurostat[3]. These data are complemented by ad hoc studies undertaken by independent contractors notably for broadband coverage, online availability of public services and for eHealth. A full list of the indicators used, sources and notes is given after the tables. The figures for broadband penetration stem from the 13th Single Telecom Market Progress Report[4] and refer to January 2008, except Estonia, France, Lithuania, the Netherlands and Austria, which refer to October 2007.

Data reported in the country profiles come from statistical sources harmonised at EU level. Some indicators, in particular for those related to e-commerce and to e-business, have to be interpreted with care because of slight changes in the definitions that could have affected comparability over time. For example, for the indicator "% of enterprises receiving orders on the Internet", a threshold of 1% was applied in 2003, but it was removed from 2004 onward.

To introduce these profiles, table 1 gives a summary of the distribution of all indicators in the form of a boxplot. Each indicator has been recalculated as the (absolute) difference, positive or negative, relative to the EU average for that indicator. These are then ranked in order and the top and bottom of the range (known as outliers) are shown as lines and the central section of the range shown as a box.[5] For example, the box for Austria extends from -1.1% to +7.6% which means that half the indicators are within this range. The negative outliers are between -1.1% and -11.1% i.e. no indicator for Austria is more than 11.1 percentage points below the EU average. The positive outliers are between +7.6% and +48.6% of the EU average. The average for all indicators in Austria is +3.4 percentage points above the EU27 mean and the median value is +2.4.

1 Iceland and Norway are members of the European Economic Area and participate as such in the Eurostat surveys, but they are not considered in the country rankings.

2 i2010 Benchmarking Framework: http://ec.europa.eu/information_society/eeurope/i2010/docs/benchmarking/060220_i2010_benchmarking_framework_nov_2006.doc

3 The data used in this version of the paper were extracted from the Eurostat database on 8.2.2008. Almost all Member States contributed to both surveys but there remain some outstanding returns.

4 Progress Report on the Single European Electronic Communications Market 2007 (13th Report), COM(2008) 153, (http://ec.europa.eu/information_society/policy/ecomm/library/communications_reports/annualreports/13th/index_en.htm).

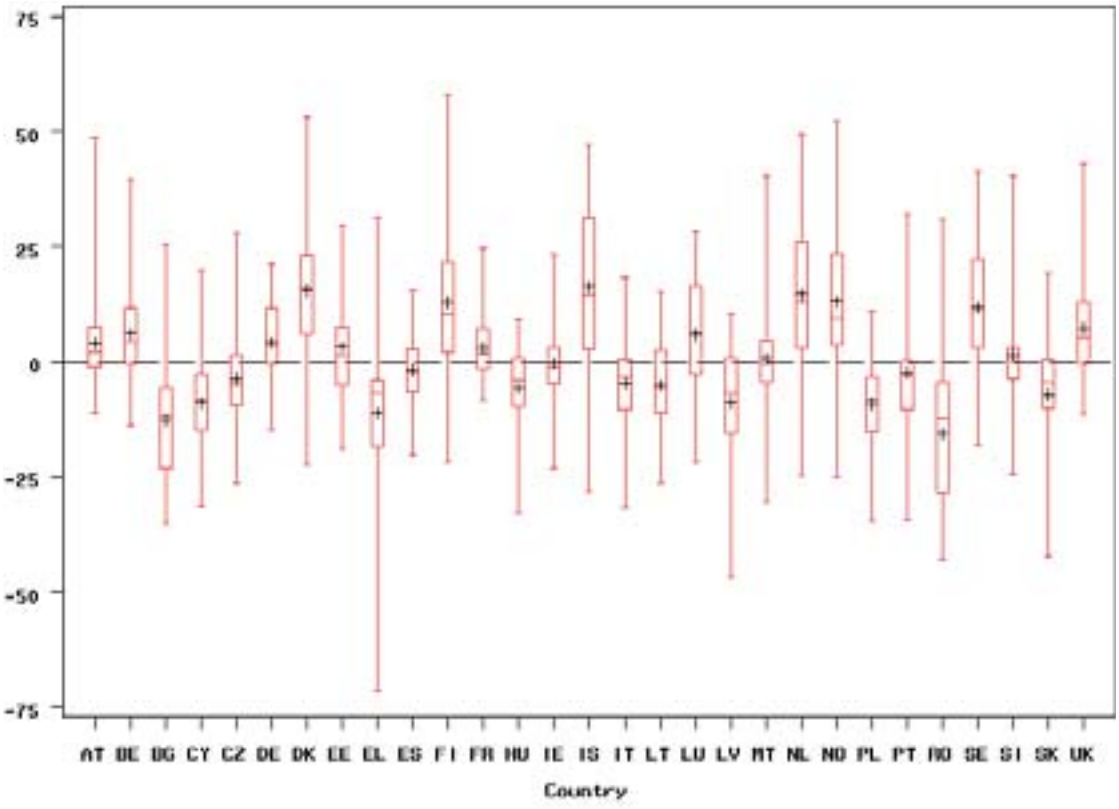
5 More precisely, the box is bounded by the upper and lower quartile of the distribution i.e. the value above/below which 25% of the distribution is situated. The lines are bounded by the highest and lowest points of the distribution. Note the chart also shows the median value (as a line) and the average value (cross).

The boxplot chart reveals that all countries have strengths and weaknesses with indicators both above and below the EU average. However, all are not equal and information society development is not equal. Three groups of countries can be distinguished:

- The most advanced for which the box lies entirely above the line. These are Denmark, Finland, Iceland, Netherlands, Norway and Sweden. For these countries, the value of more than 75% of the indicators is greater than the EU average. Austria, Belgium, Germany, France, Luxembourg and the UK are nearly in this group, having a lower quartile only slightly below zero.
- The least developed for which the box lies entirely below the line: Bulgaria, Cyprus, Greece, Poland and Romania. For these countries, the value of more than 75% of the indicators is less than the EU average. Slovakia Hungary, Italy, Latvia are nearly in this group, having a lower quartile only slightly above zero.
- The remainder with values distributed above and below the EU average.

This shows that the pattern of information society development has remained largely unchanged over the past five years: more advanced in the Nordic countries plus Netherlands and the UK and lagging in many of the countries of Eastern and Central Europe and the Mediterranean.

Table 1: **All Indicators: diferences with respect to EU average**



1. Austria

The information society at large — connectivity, ICT usage by households, enterprises and governments — is more developed than on average in the EU. However, Austria is not one of the frontrunners, except for eGovernment services, for which Austria has been leading developments in the EU consistently over the recent years.

Broadband

Total DSL coverage has increased significantly in Austria and the penetration rate reached 19.0% in October 2007 (up from 17.4%), with a slowdown in its growth rate. 61.5% of broadband lines in Austria were based on DSL technology. Regular Internet use and households' broadband take-up reach average levels, while enterprises' take-up is lagging behind. Despite average broadband penetration and widespread Internet usage, Austrians consume far less audiovisual online content than the average European. This is partly related to limited access speeds, which have not improved over the past year.

Online public services

Austria is the first Member State to achieve a 100% ***fully online availability***, which means that for every service measured in this survey, each citizen or business has the possibility to access the service via a fully transactional electronic channel. Even with the introduction of a renewed method and 5th stage of ***online sophistication*** measurement, Austria achieved 99%. Further progress in sophistication can only be made on child allowances and public libraries. With this scoring, Austria remains at the top of the web-based benchmark on electronic public services for the second year.

In terms of take-up of on-line public services, the story is quite different. The results for citizens using eGovernment is average, and they are ranked 12th. For businesses usage the result is slightly better, reaching 10th position.

Austrian citizens no longer need to request certificates for birth or marriages. Due to the Central Register of Residents the authority that needs information now gets it automatically. At the same time they verify the accuracy of the data. However, each citizen has the right to check data about him/her, and update this if necessary by presenting the relevant documents.

ICTs in the economy

While Austria has a higher than average intensity in research in ICTs, the conditions are less favourable for ICT developments with respect to eSkills. Austrians generally have lower than average levels of ICT skills 38% of the population having 'low' Internet skills compared to the EU average of 29%, a proportion that has remained constant for the last three surveys. The proportion with 'high' levels of Internet skills has grown but is still slightly below the EU average. This has not, however, slowed down the adoption of ICTs by businesses: businesses in Austria have a rather high propensity to use ICTs and e-commerce

Austria

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)	86	86	86	91		89	12
DSL coverage in rural areas (as % of total population)			67	79		72	11
Broadband penetration (as % of population)	7.5	10.1	14.3	17.4	19.0	20.0	11
DSL penetration (as % of population)	3.4	5.4	8.3	10.6	11.7	16.0	15
Predominant download speed				512 Kbps-1 Mbps	512 Kbps-1 Mbps		
% of households with an internet connection			47	52	60	54	9
Households with broadband as % of households with internet			50	63	77	77	15
% of enterprises with broadband access	48	55	61	69	72	77	18
Internet usage							
% population who are regular internet users			49	55	61	51	9
Take up of internet services (as % of population)							
sending emails			48	53	54	48	9
looking for information about goods and services			42	47	47	47	11
Internet telephoning or videoconferencing			4	7	12	10	11
playing/downloading games and music			14	15	17	22	22
listening to the web radio/watching web tv			5	7	7	15	26
reading online newspapers/magazines			21	26	24	21	11
internet banking			22	27	30	25	11
eGovernment indicators							
% basic public services for citizens fully available online	55	60		70	100	51	1
% basic public services for enterprises fully available online	88	88		100	100	72	1
% of population using e-Government services			29	33	27	30	12
of which for returning filled in forms			12	12	13	13	12
% of enterprises using e-Government services	81	74	75	81	81	65	10
of which for returning filled in forms	42	47	41	54	54	45	14
e-Health							
% of GPs with broadband connection					37	48	18
% of GPs with secondary care connection					34	24	8
% of GPS using electronic networks for transfer of patient data					44	48	10
e-Commerce							
e-commerce as % of total turnover of enterprises	6	7	7	10		11	
% enterprises receiving internet orders	9	14	13	18	20	14	6
% enterprises purchasing on the internet		38	39	51	56	39	5
e-business. % enterprises:							
with integrated internal business processes	34	33	35	37	49	41	8
with integrated external business processes	13	15	15	17	19	14	6
using ERP systems					28	17	5
using analytical CRM					29	17	2
sending/receiving e-invoices					18	18	12
using digital signatures					9	16	21
using secure protocols for internet orders					8	5	6
using open sources operating systems					17	12	5
Employment and skills							
% of the population with no internet skills			43	37	31	40	20
% of the population with low internet skills			38	36	38	29	21
% of the population with medium internet skills			16	20	23	23	
% of the population with high internet skills			3	7	8	8	
% of persons employed with ICT user skills.	13.3	19.6	18.6	18.3	17.5	18.2	19
% of persons employed with ICT specialist skills	3.8	2.9	3.0	3.1	3.0	3.1	13
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP	5.3	5.2				5.3	14
ICT sector share of total employment	3.6	3.5				3.8	15
ICT sector growth (constant prices).	3.8	3.7				4.6	11
ICT R&D expenditure by the business sector, as % of GDP	0.42	0.47				0.31	4
=== as % of total R&D expenditure	20.1	31.2				26.3	8
% of ICT exports on total exports	8.4	7.2	6.5	6.6			15

2. Belgium

The information society is more developed in Belgium than on average in the EU. However, Belgium is not one of the frontrunners in the EU: although broadband markets are highly developed, eGovernment services and household Internet usage are above average but not among the most developed in the Union.

Broadband

The pace of growth of take-up (about 3 percentage points) has stayed beneath the European average and behind numerous other fast-growing Member States, despite complete broadband coverage. However, Belgium does seem to have achieved an almost full transition from narrowband to broadband as 94% of Internet connected households now use a broadband connection and speeds on average are high.

With 25.6% broadband penetration and a 6th place (as of January 2008) in the EU ranking, Belgium is slowing down its performance in the European ranking of Internet usage where none of the indicators improve its positioning among the EU Member States.

Online public services

Belgium has made good progress in 2007. The average ***fully online availability*** for all basic public services has grown by 10% compared to last year and is now at 60%. The level of ***online sophistication*** has also risen to a level of 80%. Belgium has shown a progressive year-on-year advancement from a position some 20% below EU27 average to now being a few percentage points above. It is also worth noting that four out of the nine relevant services reached the ***pro-active*** stage 5 of sophistication level, the EU27 average being 3 out of nine. But an area of concern is the fact that availability of services to citizens is less than half the average level for services to enterprises. Although availability and sophistication have improved, take-up by both businesses and citizens has actually decreased from 2006 figures by 8 and 7% respectively. Indeed Belgium is 24th in the rankings for usage by businesses.

2007 saw the upgrade of the Federal eGovernment portal, Belgium.be, in terms of content and functionalities. New projects were expected to produce first results in the course of the year: the ePolice office; the Be-Health platform; the Front-Office Employment and the electronic birth declaration. Other actions such as the e-ID cards for children under 12 (Kids-ID) and the e-ID knowledge management panel were also to be developed and implemented in 2007.

ICTs in the economy

The benefits of ICTs to the Belgian economy come both from a large and successful ICT sector and through the use and investment in ICTs by the wider economy. The ICT sector in Belgium is relatively large both in terms of value added and employment. The growth of the sector exceeded EU sector growth with an increase of 5.1% at constant prices. The wider business sector spends a higher than average amount on ICT R&D and 86% of Belgian businesses have broadband connections, the 7th highest figure in Europe. This translates into above average rates of e-commerce orders and a higher than average adoption of e-business applications.

In terms of skills, the Belgian population is generally close to the EU average but a higher proportion has low skill levels and the proportion with high Internet skills is particularly low. This latter figure is confirmed by the Labour Force Survey which showed that only 2.5% of persons employed had specialist ICT skills compared to 3.1% across the EU.

Belgium

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)	100	100	100	100		89	1
DSL coverage in rural areas (as % of total population)			100	100		72	1
Broadband penetration (as % of population)	12.0	15.5	19.2	22.8	25.6	20.0	6
DSL penetration (as % of population)	7.4	9.5	11.9	14.0	15.3	16.0	10
Predominant download speed				2-8 Mbps	2-8 Mbps		
% of households with an internet connection			50	54	60	54	8
Households with broadband as % of households with internet			81	89	94	77	1
% of enterprises with broadband access	49	70	78	84	86	77	7
Internet usage							
% population who are regular internet users			53	58	63	51	8
Take up of internet services (as % of population)							
sending emails			49	54	60	48	8
looking for information about goods and services			43	51	55	47	8
Internet telephoning or videoconferencing				8	10	10	14
playing/downloading games and music			17	20	23	22	13
listening to the web radio/watching web tv				11	13	15	18
reading online newspapers/magazines			13	16	17	21	21
internet banking			23	28	35	25	8
eGovernment indicators							
% basic public services for citizens fully available online	17	17		18	42	51	16
% basic public services for enterprises fully available online	63	63		88	88	72	5
% of population using e-Government services			18	30	23	30	17
of which for returning filled in forms			4	7	8	13	18
% of enterprises using e-Government services		60	61	59	51	65	24
of which for returning filled in forms	25	26	33	37	37	45	20
e-Health							
% of GPs with broadband connection					80	48	5
% of GPs with secondary care connection					64	24	4
% of GPS using electronic networks for transfer of patient data					75	48	6
e-Commerce							
e-commerce as % of total turnover of enterprises	7	6	9	8	11	11	7
% enterprises receiving internet orders	16	15	12	15	18	14	7
% enterprises purchasing on the internet		39	52	44	53	39	7
e-business. % enterprises:							
with integrated internal business processes	46	50	47	44	49	41	7
with integrated external business processes	12	14	14	17	18	14	7
using ERP systems					29	17	4
using analytical CRM					17	17	8
sending/receiving e-invoices					31	18	4
using digital signatures					27	16	5
using secure protocols for internet orders					6	5	10
using open sources operating systems					13	12	11
Employment and skills							
% of the population with no internet skills				37	32	40	9
% of the population with low internet skills				39	40	29	
% of the population with medium internet skills				19	23	23	
% of the population with high internet skills				5	5	8	23
% of persons employed with ICT user skills.	17.2	17.9	18.9	18.5	18.5	18.2	17
% of persons employed with ICT specialist skills	2.1	2.7	2.5	2.6	2.5	3.1	23
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP	4.9	4.9				5.3	17
ICT sector share of total employment	3.6	3.5				3.8	14
ICT sector growth (constant prices).	0.8	5.1				4.6	8
ICT R&D expenditure by the business sector, as % of GDP	0.33	0.31				0.31	9
=== as % of total R&D expenditure	24.8	23.9				26.3	12
% of ICT exports on total exports	6.6	6.2	5.8	5.3			19

3. Bulgaria

The benchmarking results make it clear that the information society in Bulgaria is at a relatively early stage of development. However, there are some strengths and signs, such as the adoption of broadband by Internet users, that Bulgaria is leapfrogging outdated technologies to catch up with its new partners in the EU.

Broadband

Broadband penetration was 7.6% in January 2008, the lowest in the EU and far below the EU27 average of 20%. Of those households connected to the Internet, 81% have a broadband connection, which is above EU average and might indicate that Bulgaria will leapfrog narrowband Internet connections.

Internet service usage is rather low except for Internet telephony or Internet videoconferencing which 11% of the population use, placing Bulgaria above the EU average.

Online public services

Bulgaria, as a new Member State, is a newcomer to the eGovernment online survey and the September 2007 results provide a base-line measurement. Overall, the ***fully-online availability*** indicator for Bulgaria is 15%, 25% for services to citizens but 0% for services to businesses. A better indication of progress is given by the ***online sophistication*** indicator score of 67% compared to the European average of 76%. Even more encouraging is that three out of the nine relevant services achieved the ***pro-active*** stage 5 sophistication level.

Take-up is still very low. With only 6% of citizens having used on-line public services, Bulgaria sits close to the bottom of the table, in 26th place for citizens and 25th place for businesses.

eGovernment is high in the list of priorities of the government. It is seen as an element of the transition from an industrial to an information society. It is a tool to increase the competitiveness of the Bulgarian economy and to improve the entire business climate. Bulgaria has benchmarked Austria in its efforts to raise the standard and level of eGovernment services provided to its increasingly e-savvy citizens.

ICTs in the economy

Enterprise Internet connectivity is in general at the same low levels as households and Bulgarian enterprises are towards the bottom of the distribution for use of e-business applications and e-commerce.

In general there are relatively low levels of ICT skills in the population with 66% having no Internet skills compared to the EU average of 40%. However this figure has fallen considerably in Bulgaria since the 2006 survey.

Bulgaria

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)						89	
DSL coverage in rural areas (as % of total population)						72	
Broadband penetration (as % of population)				4.5	7.6	20.0	27
DSL penetration (as % of population)				1.2	2.1	16.0	26
Predominant download speed							
% of households with an internet connection				17	19	54	27
Households with broadband as % of households with internet				59	81	77	12
% of enterprises with broadband access		28	32	57	61	77	23
Internet usage							
% population who are regular internet users				22	28	51	25
Take up of internet services (as % of population)							
sending emails				19	25	48	25
looking for information about goods and services				13	17	47	26
Internet telephoning or videoconferencing				7	11	10	12
playing/downloading games and music				12	16	22	23
listening to the web radio/watching web tv				11	10	15	21
reading online newspapers/magazines				11	10	21	26
internet banking				1	2	25	27
eGovernment indicators							
% basic public services for citizens fully available online					25	51	21
% basic public services for enterprises fully available online					0	72	27
% of population using e-Government services				8	6	30	26
of which for returning filled in forms				2	3	13	26
% of enterprises using e-Government services		38	32	46	45	65	25
of which for returning filled in forms		9	11	23	29	45	24
e-Health							
% of GPs with broadband connection					23	48	25
% of GPs with secondary care connection					8	24	22
% of GPS using electronic networks for transfer of patient data					17	48	19
e-Commerce							
e-commerce as % of total turnover of enterprises		4		0	1	11	21
% enterprises receiving internet orders		3	3	4	2	14	26
% enterprises purchasing on the internet		7	7	6	5	39	26
e-business. % enterprises:							
with integrated internal business processes		6		6	17	41	24
with integrated external business processes		2		3	5	14	25
using ERP systems					8	17	24
using analytical CRM					9	17	24
sending/receiving e-invoices					9	18	23
using digital signatures					28	16	4
using secure protocols for internet orders					0	5	26
using open sources operating systems					8	12	23
Employment and skills							
% of the population with no internet skills				72	66	40	26
% of the population with low internet skills				10	13	29	
% of the population with medium internet skills				13	15	23	
% of the population with high internet skills				5	7	8	20
% of persons employed with ICT user skills.	11.3	11.7	11.6	11.4	11.7	18.2	26
% of persons employed with ICT specialist skills	2.6	2.7	3.1	2.6	2.7	3.1	22
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP						5.3	
ICT sector share of total employment						3.8	
ICT sector growth (constant prices).						4.6	
ICT R&D expenditure by the business sector, as % of GDP						0.31	
=== as % of total R&D expenditure						26.3	
% of ICT exports on total exports	2.0	1.8	2.0	2.0			27

4. Cyprus

Cyprus is among the lowest placed in the ranking of most information society indicators but efforts in developing eGovernment services and a business environment relatively favourable to ICT investment, in particular with a good eSkill base, are laying the foundations for further development.

Broadband

From a figure of only 2.5% in 2004, broadband penetration in Cyprus reached 13.8% by January 2008. From 2006 to 2007 Cyprus demonstrated a growth in take-up of 56% in general and a growth of 26% in broadband take-up by enterprises. Notwithstanding the rapidly increasing broadband penetration, these figures are still relatively low and below the EU average.

Usage of services is growing but is still low and below the EU average.

Online public services

Cyprus has made solid gains each year for the last three measurements in online availability. This year it reached an overall ***fully-online availability*** figure of 45%; up from 35% last year. Cyprus progressively closes the gap with the EU27 average. The ***online sophistication*** of Cyprus, with the new method taken into account, is at 67%. Take-up is lower than the EU average, particularly by enterprises, where Cyprus is placed 23rd in the rankings, and is last place for the percentage of businesses using eGovernment for sending filled in forms.

The government is working on developing "Citizen Centric" web-enabled systems in order to provide high quality services to the citizens and businesses. Beyond 2007, priorities will include the creation of government-wide data warehouse, the completion of the rollout of the Office Automation System, the delivery of more eServices to the public and the promotion of e-Democracy and e-Participation projects.

ICTs in the economy

R&D expenditure on ICTs is low as a percentage of GDP but high as a proportion of total R&D expenditure. This indicates that overall R&D expenditure is low but the small amount undertaken is highly focussed on ICTs. But the dissemination of ICTs in the economy remains weak. Enterprise use of e-business and e-commerce services is generally low. There are relatively low levels of ICT skills in the population with 60% reporting having no Internet skills compared to the EU average for this of 40%. However this figure has fallen considerably in the course of the three household surveys undertaken.

Cyprus

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)	0		70	70		89	22
DSL coverage in rural areas (as % of total population)			0	0		72	22
Broadband penetration (as % of population)		2.5	6.3	8.9	13.8	20.0	21
DSL penetration (as % of population)		2.4	5.9	8.8	13.7	16.0	12
Predominant download speed				up to 512 Kbps	512 Kbps-1 Mbps		
% of households with an internet connection			32	37	39	54	22
Households with broadband as % of households with internet			14	34	52	77	25
% of enterprises with broadband access		35	40	55	69	77	21
Internet usage							
% population who are regular internet users			26	29	35	51	23
Take up of internet services (as % of population)							
sending emails			23	25	30	48	24
looking for information about goods and services			24	27	32	47	22
Internet telephoning or videoconferencing			2	5	6	10	24
playing/downloading games and music			15	17	20	22	18
listening to the web radio/watching web tv			9	9	13	15	17
reading online newspapers/magazines			15	20	22	21	13
internet banking			6	6	12	25	20
eGovernment indicators							
% basic public services for citizens fully available online		17		25	33	51	18
% basic public services for enterprises fully available online		38		50	63	72	17
% of population using e-Government services			11	13	20	30	18
of which for returning filled in forms			2	3	10	13	15
% of enterprises using e-Government services		35	40	44	54	65	23
of which for returning filled in forms		11	9	8	14	45	27
e-Health							
% of GPs with broadband connection					32	48	24
% of GPs with secondary care connection					10	24	20
% of GPS using electronic networks for transfer of patient data					17	48	20
e-Commerce							
e-commerce as % of total turnover of enterprises			0	2	1	11	20
% enterprises receiving internet orders		7	4	6	6	14	20
% enterprises purchasing on the internet		27	27	21	22	39	16
e-business. % enterprises:							
with integrated internal business processes		35	31	40	44	41	10
with integrated external business processes		15	5	10	6	14	23
using ERP systems					20	17	11
using analytical CRM					14	17	15
sending/receiving e-invoices					10	18	20
using digital signatures					4	16	26
using secure protocols for internet orders					3	5	14
using open sources operating systems					9	12	21
Employment and skills							
% of the population with no internet skills			69	66	60	40	24
% of the population with low internet skills			20	20	25	29	
% of the population with medium internet skills			9	11	12	23	
% of the population with high internet skills			2	3	3	8	26
% of persons employed with ICT user skills.	18.5	17.7	17.7	18.9	19.5	18.2	12
% of persons employed with ICT specialist skills	2.6	2.6	2.4	2.6	2.9	3.1	15
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP						5.3	
ICT sector share of total employment						3.8	
ICT sector growth (constant prices).						4.6	
ICT R&D expenditure by the business sector, as % of GDP	0.03	0.03				0.31	22
=== as % of total R&D expenditure	35.1	41.7				26.3	4
% of ICT exports on total exports	2.5	5.3	7.9	5.7			18

5. Czech Republic

The information society in the Czech Republic is still lagging behind in comparison to general developments in the EU, and for most of the benchmarking indicators it is below the EU average. However, there are signs that this may be evening out with strong progress in eGovernment, rapid adoption of broadband by Internet users, and a business environment relatively favourable to ICT investment, in particular with a good eSkill base.

Broadband

Broadband penetration has increased from at 9.6% in October 2006 to 14.6% in December 2007, with more than half of users benefiting from technologies other than DSL.

The transition from narrowband to broadband connections in households is growing fast with a 41% increase from 2006 to 2007. A major driver in the broadband transition is the use of Internet telephony or videoconferencing which almost doubled from 2006 to 2007 and is well above EU average. The use of other online services is still relatively low and in general below EU average.

Online public services

The Czech Republic has made a significant jump for ***fully-online availability*** to a 55% score in 2007. Spectacular progress has been made for services to businesses which are now the highest in the EU with Malta and Austria at 100%. Services to citizens, however, lag behind with one of the lowest figures for online availability at half the EU average. Online sophistication is slightly below the average, at 71%. Take-up of eGovernment by citizens is among the lowest in the EU, coming 23rd in the rankings. For businesses, the picture is better, their take-up being 8 points above the EU average.

Most public administration services are already available online in the form of providing information or downloadable forms. Therefore, in the coming period, the Government is going to place an emphasis primarily on the development of transaction services.

ICTs in the economy

As a percentage of GDP, the ICT sector comprises nearly 6% of the Czech economy, well above the EU average. This is not reflected in employment figures with only 4% of the workforce in ICTs which suggests high productivity in the sector. It is not reflected in a strong intensity in ICT research with low R&D expenditure, comprising 0.1% of GDP (EU average: 0.3%) and 13.9% of overall R&D.

Enterprises are significantly more advanced than citizens with over three quarters now having broadband connections, a rapid increase since last year. The proportion of enterprises carrying out e-Commerce is slightly below the EU average but use of most eBusiness applications is higher than average.

ICT skills in the population changed significantly between 2006 and 2007 with far fewer people reporting no or low levels of Internet skills and a threefold growth in high level skills to above the EU average.

Czech Republic

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)			75	81		89	20
DSL coverage in rural areas (as % of total population)						72	
Broadband penetration (as % of population)		2.2	6.4	10.6	14.6	20.0	19
DSL penetration (as % of population)		1.0	3.0	4.8	6.0	16.0	23
Predominant download speed							
% of households with an internet connection			19	29	35	54	24
Households with broadband as % of households with internet			27	57	80	77	13
% of enterprises with broadband access	20	38	52	69	77	77	14
Internet usage							
% population who are regular internet users			26	36	42	51	20
Take up of internet services (as % of population)							
sending emails			27	37	42	48	18
looking for information about goods and services			20	32	37	47	18
Internet telephoning or videoconferencing			6	9	16	10	7
playing/downloading games and music			9	12	20	22	19
listening to the web radio/watching web tv			3	6	8	15	23
reading online newspapers/magazines			12	19	22	21	14
internet banking			5	10	12	25	24
eGovernment indicators							
% basic public services for citizens fully available online		17		8	25	51	21
% basic public services for enterprises fully available online		50		63	100	72	1
% of population using e-Government services			5	17	16	30	23
of which for returning filled in forms			1	3	4	13	25
% of enterprises using e-Government services		75	79	76	73	65	15
of which for returning filled in forms	22	24	32	32	34	45	23
e-Health							
% of GPs with broadband connection					39	48	17
% of GPs with secondary care connection					10	24	18
% of GPS using electronic networks for transfer of patient data					33	48	13
e-Commerce							
e-commerce as % of total turnover of enterprises	6	6	8	7	9	11	10
% enterprises receiving internet orders	17	13	15	9	10	14	14
% enterprises purchasing on the internet		31	37	27	32	39	12
e-business. % enterprises:							
with integrated internal business processes			18	28	31	41	18
with integrated external business processes			4	10	8	14	21
using ERP systems					19	17	12
using analytical CRM					15	17	10
sending/receiving e-invoices					33	18	3
using digital signatures					24	16	7
using secure protocols for internet orders					3	5	15
using open sources operating systems					22	12	2
Employment and skills							
% of the population with no internet skills				52	47	40	18
% of the population with low internet skills				30	25	29	
% of the population with medium internet skills				14	17	23	
% of the population with high internet skills				4	11	8	8
% of persons employed with ICT user skills.	15.6	16.5	16.9	17.4	17.9	18.2	18
% of persons employed with ICT specialist skills	3.8	3.9	3.9	4.1	4.4	3.1	2
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP	6.2	5.7				5.3	7
ICT sector share of total employment	3.9	4.0				3.8	10
ICT sector growth (constant prices).	2.0	1.7				4.6	17
ICT R&D expenditure by the business sector, as % of GDP	0.11	0.11				0.31	15
=== as % of total R&D expenditure	14.4	13.9				26.3	20
% of ICT exports on total exports	10.8	12.2	12.1	13.6			7

6. Denmark

Denmark is among the top nations in most i2010 indicators and is a clear leader in developing the information society. It is the leader for broadband connectivity and the volume of e-commerce. However, other countries have been catching up in areas such as eGovernment.

Broadband

Denmark ranks first in the EU in terms of broadband penetration with a rate of 35.6% (as of January 2008). 89% of Internet connected households subscribe to broadband, up 11 percentage points over one year. Broadband take-up by enterprises is high and growth is stalling.

The use of online services is in general high in Denmark however; the use of Internet telephony or videoconferencing has decreased from 2006 to 2007.

Online public services

Denmark's overall level of ***online sophistication*** is 80% and of ***fully online availability*** is 63%. Progress has however flattened from an upper quartile position in recent years to around the EU average for both services to citizens and to businesses. Take-up of eGovernment, however, is remarkable. Danish citizens are twice more likely to use eGovernment than the EU average placing Denmark third in the rankings. Results for their companies are even better with 88% eGovernment users, the 3rd highest in the EU.

Over the years, digitalisation has become a natural part of providing public services throughout the public sector, with large parts of the communication between citizens, businesses and the public sector being made electronically. In this context, the 2007-2010 Danish eGovernment strategy raises the level of ambition and sets new standards for the development of citizen services and cohesion across the public sector. The new strategy entails a better and more binding cooperation among all levels of government

ICTs in the economy

As well as being one of the leading countries in terms of use of ICTs, Denmark is one of the leaders in ICT-related investment in R&D which makes up more than half of one percent of GDP and nearly a third of all investment. Danish businesses are overall the most advanced Internet, e-commerce and e-business users in the EU.

High levels of use by citizens and businesses do not translate into high skill levels. Results from the 2007 Household Survey show that 12% of Danes have high level Internet skills. However, the Labour Force Survey shows the proportion of employees with ICT user skills and ICT specialist skills to be amongst the highest in Europe.

Denmark

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)	95	95	100	100		89	1
DSL coverage in rural areas (as % of total population)			100	100		72	1
Broadband penetration (as % of population)	13.5	19.2	24.7	31.9	35.6	20.0	1
DSL penetration (as % of population)	8.8	11.8	15.4	19.4	21.9	16.0	5
Predominant download speed				512 Kbps-1 Mbps	1-2 Mbps		
% of households with an internet connection			75	79	78	54	3
Households with broadband as % of households with internet			68	80	89	77	3
% of enterprises with broadband access	69	80	82	83	80	77	9
Internet usage							
% population who are regular internet users			73	78	76	51	2
Take up of internet services (as % of population)							
sending emails			69	74	74	48	2
looking for information about goods and services			63	68	68	47	5
Internet telephoning or videoconferencing			9	13	11	10	13
playing/downloading games and music			21	26	33	22	5
listening to the web radio/watching web tv			19	27	34	15	2
reading online newspapers/magazines			38	46	47	21	3
internet banking			49	57	57	25	3
eGovernment indicators							
% basic public services for citizens fully available online	55	33		42	50	51	14
% basic public services for enterprises fully available online	88	88		88	86	72	13
% of population using e-Government services				43	58	30	1
of which for returning filled in forms				17	33	13	2
% of enterprises using e-Government services	75	85	87	87	88	65	3
of which for returning filled in forms	35		56	55	61	45	6
e-Health							
% of GPs with broadband connection					91	48	2
% of GPs with secondary care connection					77	24	2
% of GPS using electronic networks for transfer of patient data					98	48	1
e-Commerce							
e-commerce as % of total turnover of enterprises	8	12		17	22	11	1
% enterprises receiving internet orders	13	27	35	35	33	14	1
% enterprises purchasing on the internet		58	64	59	59	39	3
e-business. % enterprises:							
with integrated internal business processes	35	36	62	63	62	41	2
with integrated external business processes	12	10	23	24	21	14	3
using ERP systems					34	17	1
using analytical CRM					17	17	7
sending/receiving e-invoices					37	18	1
using digital signatures					30	16	3
using secure protocols for internet orders					11	5	1
using open sources operating systems					9	12	20
Employment and skills							
% of the population with no internet skills			19	14	18	40	2
% of the population with low internet skills			47	40	37	29	
% of the population with medium internet skills			27	33	34	23	
% of the population with high internet skills			7	13	12	8	6
% of persons employed with ICT user skills.	22.9	22.6	23.2	23.4	23.2	18.2	3
% of persons employed with ICT specialist skills	4.2	4.0	3.5	3.9	4.1	3.1	5
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP	5.3	5.2				5.3	11
ICT sector share of total employment	4.5	4.5				3.8	6
ICT sector growth (constant prices).	7.5	4.0				4.6	10
ICT R&D expenditure by the business sector, as % of GDP	0.58	0.51				0.31	3
=== as % of total R&D expenditure	32.4	30.0				26.3	9
% of ICT exports on total exports	5.5	5.4	7.2	6.0			17

7. Estonia

Estonia is well advanced in the information society, with many benchmarking indicators significantly above the EU average, notably in the area of broadband connectivity, households' Internet usage and eGovernment services. However, the take-up of ICTs by businesses does not keep pace with these positive developments.

Broadband

Estonian households and enterprises have a higher level of broadband connectivity than the EU average — with a broadband penetration rate of 21.2% (as of October 2007), Estonia is not only showing the best performance of the Member States that joined the EU since May 2004, but is also still outperforming Greece, Portugal, Italy, Ireland, Spain and Austria — and growth is continuing. However, growth is lower than in other Member States causing Estonia to move a little down in the ranking. 90% of households are connected to the Internet via broadband which is the third highest share in the EU and platform competition provides alternative connections to DSL.

The use of Internet services is in general higher than EU average in particular in terms of online reading of newspapers/magazines.

Online public services

With a level of ***fully-online availability of 70%*** and ***sophistication at 87%***, is above the EU average for services to enterprises and to citizens. Although remarkable, these figures show that Estonia has slipped from being runner up in 2006 to 8th in 2007. However, it is worth noting that 6 out of the nine relevant services reached the fifth level of sophistication and were thus classified as proactive. This is twice the average.

Usage by citizens is on the EU average at 30%, whereas businesses' use of eGovernment is 11 points above the average with 76% of companies using eGovernment.

One of the objectives of the "Estonian Information Society Strategy 2013" is the development of citizen-centred, transparent and efficient public administration. According to this objective, the administration should function efficiently while collecting, using and managing data necessary for the provision of public goods in a common and systematic manner. In addition, public services for citizens and businesses must be fully available electronically, widely used and oriented on users' needs. By 2013, the strategy sets the objective of 80% of citizen satisfaction and 95% of business satisfaction when using eGovernment.

ICTs in the economy

In terms of broadband connectivity, Estonia is above the EU average and continues to show a remarkable performance. However, the proportion of enterprises involved in e-commerce is less than half the average and they are also below average in use of most e-business applications. Investment in ICT-related R&D more than doubled between 2003 and 2004 but this still left it well below the EU average. The economic strength of the Estonian economy lies in skills and it is 2nd highest in Europe in terms of the proportion of the population with high level Internet skills. The Labour Force Survey confirms that a higher than average proportion of persons employed have ICT user skills.

Estonia

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)			90	90		89	13
DSL coverage in rural areas (as % of total population)						72	
Broadband penetration (as % of population)		10.3	13.3	18.4	21.2	20.0	10
DSL penetration (as % of population)		4.8	6.2	8.9	9.7	16.0	17
Predominant download speed							
% of households with an internet connection			39	46	53	54	13
Households with broadband as % of households with internet			77	80	90	77	2
% of enterprises with broadband access		68	67	76	78	77	12
Internet usage							
% population who are regular internet users			54	56	59	51	10
Take up of internet services (as % of population)							
sending emails			49	49	54	48	10
looking for information about goods and services			41	44	48	47	10
Internet telephoning or videoconferencing			10	14	16	10	6
playing/downloading games and music			24	28	29	22	6
listening to the web radio/watching web tv			15	17	21	15	7
reading online newspapers/magazines			46	50	50	21	1
internet banking			45	48	53	25	5
eGovernment indicators							
% basic public services for citizens fully available online		36		64	58	51	9
% basic public services for enterprises fully available online		100		100	88	72	5
% of population using e-Government services			31	29	30	30	10
of which for returning filled in forms			17	17	20	13	5
% of enterprises using e-Government services		84	70	69	76	65	14
of which for returning filled in forms		54	50	54	58	45	10
e-Health							
% of GPs with broadband connection					72	48	7
% of GPs with secondary care connection					38	24	7
% of GPS using electronic networks for transfer of patient data					43	48	11
e-Commerce							
e-commerce as % of total turnover of enterprises		3	2			11	
% enterprises receiving internet orders		9	7	14	6	14	21
% enterprises purchasing on the internet		31	23	25	20	39	18
e-business. % enterprises:							
with integrated internal business processes		28	25	24	24	41	21
with integrated external business processes		5	4	9	11	14	19
using ERP systems					11	17	22
using analytical CRM					10	17	23
sending/receiving e-invoices					25	18	8
using digital signatures					9	16	22
using secure protocols for internet orders					2	5	22
using open sources operating systems					16	12	7
Employment and skills							
% of the population with no internet skills			41	37	35	40	10
% of the population with low internet skills			18	17	17	29	
% of the population with medium internet skills			21	24	20	23	
% of the population with high internet skills			20	21	28	8	2
% of persons employed with ICT user skills.	17.0	17.2	19.4	17.8	19.7	18.2	10
% of persons employed with ICT specialist skills	2.3	2.4	2.6	2.5	2.7	3.1	20
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP						5.3	
ICT sector share of total employment						3.8	
ICT sector growth (constant prices).						4.6	
ICT R&D expenditure by the business sector, as % of GDP	0.05	0.12				0.31	13
=== as % of total R&D expenditure	18.6	36.9				26.3	6
% of ICT exports on total exports	12.1	13.5	13.9	11.7			10

8. Finland

Finland is one of the best performing countries in Europe and leads the way in information society developments in all respects. It also has one of the most competitive and dynamic ICT sectors in the EU. However, there are signs that a sizeable group of companies are not using eBusiness tools at a level matching the overall development in Finland.

Broadband

Finland moved up to second place in the EU ranking of broadband connectivity (34.6% in January 2008) and the growth rate remains high with a 7.5 percentage point increase in 2007. Growth in take-up of broadband among enterprises moved Finland up to first place from second last year. Currently, 91% of Finnish enterprises have a broadband connection and 87% of Internet connected households subscribe to broadband.

The high broadband take-up is clearly reflected in the use of Internet services where Finland is placed among the highest ranking countries on all measured services.

Online public services

Finland's progress for ***fully-online availability*** has flattened in recent years after a period of rapid growth, although the overall indicator increased by 6 percentage points to reach 67% in 2007, placing Finland in the 13th position. Availability of services to enterprises at 50% is far below the EU average and has been declining of the course of the survey. On the other hand services to citizens are above average. Indeed, Finland is one of those rare countries where citizens are better served than businesses. ***Online sophistication*** was measured at 82%, slightly above average. It is encouraging to note that five out of the nine relevant services achieved the ***pro-active*** sophistication well above the average.

Finns have truly taken to eGovernment, with half of them having used it in the past year. A remarkable 94% of businesses have used eGovernment, of which 78% did so for sending filled forms. These very high figures mean Finland tops the league on both counts.

Finland's most recent eGovernment strategic priorities are laid down in the National Knowledge Society Strategy 2007-2015. By 2015, Finnish public services will be produced in a customer-oriented and economical manner as processes that cross the organisational lines within public administration and in cooperation with other parties. As much as possible, electronic services will be produced in a manner that, on the one hand, forecasts the needs of citizens and businesses, and on the other hand, uses existing information.

ICTs in the economy

ICTs already make a major contribution to the Finnish economy. The sector itself represents 10% of the economy; ICT-related investment in R&D by the business sector makes up over 60% of all R&D and over 1.5% of GDP; enterprise connectivity to broadband is the highest in Europe at 91%; e-commerce contributes 15% of business turnover and use of eBusiness is advanced. Skill levels are high both in the workforce and throughout the population.

Finland

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)	88	89	90	92		89	11
DSL coverage in rural areas (as % of total population)			78	82		72	10
Broadband penetration (as % of population)	8.6	14.9	22.4	27.1	34.6	20.0	2
DSL penetration (as % of population)	6.3	11.2	17.7	22.1	25.6	16.0	1
Predominant download speed				up to 512 Kbps	1-2 Mbps		
% of households with an internet connection			54	65	69	54	6
Households with broadband as % of households with internet			67	82	87	77	6
% of enterprises with broadband access	65	71	81	89	91	77	1
Internet usage							
% population who are regular internet users			62	71	75	51	4
Take up of internet services (as % of population)							
sending emails			63	67	71	48	3
looking for information about goods and services			62	67	68	47	3
Internet telephoning or videoconferencing			10	14	18	10	5
playing/downloading games and music			22	33	34	22	3
listening to the web radio/watching web tv			17	20	24	15	5
reading online newspapers/magazines			41	46	50	21	2
internet banking			56	63	66	25	1
eGovernment indicators							
% basic public services for citizens fully available online	50	60		60	80	51	6
% basic public services for enterprises fully available online	75	75		63	50	72	21
% of population using e-Government services			47	47	50	30	5
of which for returning filled in forms			11	15	17	13	10
% of enterprises using e-Government services	89	91	91	93	94	65	1
of which for returning filled in forms	55	61	71	78	78	45	1
e-Health							
% of GPs with broadband connection					93	48	1
% of GPs with secondary care connection					82	24	1
% of GPS using electronic networks for transfer of patient data					91	48	2
e-Commerce							
e-commerce as % of total turnover of enterprises	11	13	14	14	15	11	4
% enterprises receiving internet orders	14	19	18	12	13	14	11
% enterprises purchasing on the internet		71	75	56	55	39	6
e-business. % enterprises:							
with integrated internal business processes	63	61	60	50	53	41	5
with integrated external business processes	17	16	17	13	15	14	9
using ERP systems					18	17	14
using analytical CRM					26	17	3
sending/receiving e-invoices					27	18	5
using digital signatures					8	16	23
using secure protocols for internet orders					6	5	11
using open sources operating systems					18	12	4
Employment and skills							
% of the population with no internet skills			30	23	21	40	3
% of the population with low internet skills			37	39	26	29	
% of the population with medium internet skills			25	28	25	23	
% of the population with high internet skills			8	10	29	8	1
% of persons employed with ICT user skills.	19.0	19.8	19.9	20.5	19.9	18.2	7
% of persons employed with ICT specialist skills	4.2	4.0	4.3	4.3	4.4	3.1	3
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP	10.9	10.3				5.3	1
ICT sector share of total employment	5.8	5.8				3.8	2
ICT sector growth (constant prices).	7.2	6.3				4.6	5
ICT R&D expenditure by the business sector, as % of GDP	1.48	1.52				0.31	1
=== as % of total R&D expenditure	61.2	62.7				26.3	1
% of ICT exports on total exports	19.1	17.0	20.2	15.6			6

9. France

France is fairly advanced in information society, with many benchmarking indicators above the EU average, notably in the area of broadband take-up and usage of Internet by households. However, ICT usage by businesses and eSkills do not match the EU average.

Broadband

The broadband market has continued to grow, with a penetration rate of 23.3% in October 2007, compared to 20.4% the year before. However, the growth rate started slightly declining last year, lowering France's ranking position. The use of broadband by enterprises is growing faster than in other Member States and France has moved from 5th to 3rd in 2007. DSL is by far the most used broadband platform.

Usage of online services has improved and is now at EU average.

Online public services

France continues to achieve a higher level of ***fully-online availability*** than average, and has now reached a score of 70%, some 12% above average, and is in 10th position. A particular strength is in services to enterprises for which online availability is 5th highest in Europe. ***Online sophistication*** is 87%, 6th overall. Four out of the nine relevant services reached the 5th level of sophistication, one more than the average. The results of usage are also above the EU average, both for citizens and for enterprises by 11 and 4 points respectively. In particular, it is worth noting the big increase of usage by citizens, 15 points up from 2006.

France's new approach to the eGovernment strategy is embodied in the ADELE Master Scheme for eGovernment (2006-2010). It includes an interoperability and security framework as well as exchange of administrative data schemes, integrates common eGovernment projects and extends the initial frame of the ADELE programme 2004-2007. The objective is to ensure a better management of public finances over a long term period as well as to simplify and render the French administration more efficient by 2010.

ICTs in the economy

France is generally close to the EU average for most indicators of ICTs in the economy. This is the case for ICT-related R&D, skills in the workforce and use of e-business applications. It moves away from the average for broadband connectivity of enterprises with the third highest figure in Europe. At the time of writing, no data was available on e-commerce.

France

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)	79	91	96	98		89	7
DSL coverage in rural areas (as % of total population)			88	96		72	5
Broadband penetration (as % of population)	6.1	11.2	16.4	20.4	23.3	20.0	9
DSL penetration (as % of population)	5.4	10.4	15.5	19.3	22.2	16.0	4
Predominant download speed				up to 512 Kbps	512 Kbps-1 Mbps		
% of households with an internet connection				41	49	54	15
Households with broadband as % of households with internet				74	87	77	7
% of enterprises with broadband access	49			86	89	77	3
Internet usage							
% population who are regular internet users				39	57	51	11
Take up of internet services (as % of population)							
sending emails				34	48	48	12
looking for information about goods and services				36	55	47	9
Internet telephoning or videoconferencing				5	9	10	16
playing/downloading games and music				9	22	22	15
listening to the web radio/watching web tv				10	17	15	11
reading online newspapers/magazines				9	18	21	19
internet banking				18	32	25	9
eGovernment indicators							
% basic public services for citizens fully available online	33	42		58	58	51	9
% basic public services for enterprises fully available online	63	63		75	88	72	5
% of population using e-Government services				26	41	30	7
of which for returning filled in forms				12	18	13	8
% of enterprises using e-Government services				66	69	65	17
of which for returning filled in forms				51	59	45	9
e-Health							
% of GPs with broadband connection					59	48	9
% of GPs with secondary care connection					17	24	12
% of GPS using electronic networks for transfer of patient data					48	48	8
e-Commerce							
e-commerce as % of total turnover of enterprises						11	
% enterprises receiving internet orders						14	
% enterprises purchasing on the internet						39	
e-business. % enterprises:							
with integrated internal business processes				53	43	41	11
with integrated external business processes				16	11	14	18
using ERP systems					16	17	16
using analytical CRM					9	17	25
sending/receiving e-invoices					10	18	21
using digital signatures					15	16	15
using secure protocols for internet orders						5	
using open sources operating systems					12	12	13
Employment and skills							
% of the population with no internet skills					36	40	12
% of the population with low internet skills					26	29	
% of the population with medium internet skills					27	23	
% of the population with high internet skills					12	8	7
% of persons employed with ICT user skills.	17.0	16.8	16.8	16.7	17.3	18.2	20
% of persons employed with ICT specialist skills	3.0	3.1	3.1	3.3	2.9	3.1	16
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP	5.6	5.5				5.3	8
ICT sector share of total employment	4.6	4.5				3.8	5
ICT sector growth (constant prices).						4.6	
ICT R&D expenditure by the business sector, as % of GDP	0.38	0.36				0.31	7
=== as % of total R&D expenditure	28.3	26.9				26.3	10
% of ICT exports on total exports	7.5	7.5	7.1	7.3			14

10. Germany

Germany is just outside the leading countries for information society development with most of benchmarking indicators having values above the EU average. Information society in Germany is driven by widespread and advanced usage of ICTs by businesses and intensive e-commerce activities. In comparison, factors such as broadband connectivity and related advanced services for households are closer to the EU average.

Broadband

The broadband market has further improved compared to the previous year. In January 2008, broadband penetration rate was 23.8% (up from 18.1% a year earlier). However, compared to leading countries in Europe, weaknesses persist in terms of coverage of rural areas: in urban areas DSL coverage is 99% but in rural areas this figure is only 58.5%[6]. DSL is by far the dominant broadband technology in Germany.

German enterprises have also increasingly adopted broadband for connecting to the Internet. With take-up of 80%, German households and enterprises are now above EU average. Usage of online services has grown steadily and is now on close to the EU average but with a bias towards high usage of low bandwidth services like emails and net banking rather than download of music or TV services. This is also reflected in the below average number of households connected to the Internet with broadband rather than narrowband. However, this indicator has taken a major leap forward from 50% to 70%.

Online public services

Germany has made remarkable progress in 2007. Germany's ***fully-online availability*** has made a very marked increase from 47% last year to 75% in 2007 to move Germany into 8th position. Both services to citizens and to businesses are in the top ten in the European ranking. Furthermore, five out of the nine relevant services have reached the fifth level of sophistication; again well above the EU average of 3 out of 9.

Take-up of eGovernment services has also progressed significantly in 2007. Among citizens it is well above the EU average at 43%, up from 32% in 2006. Use by enterprises has also risen significantly, but Germany is still below the EU average on this.

According to the national strategy, the eGovernment 2.0 programme, Internet shall become the major communication and distribution channel for public administration services. Secure Internet transactions in the area of electronic business and eGovernment will be realised and facilitated through the usage of e-Identification Cards. Certified portals will constitute a secure communication platform for citizens.

ICTs in the economy

The overall level of investment in R&D by the business sector in Germany is high but the proportion devoted to ICTs is comparatively low. However, German enterprises are above average in use of e-Business applications and amongst the leaders in Europe for e-commerce particularly on the purchasing side. In terms of ICT skills, there has been a steady increase in the general population which is now close to the EU average. The Labour Force Survey confirms this, showing around average proportion of ICT users and specialists amongst employees.

6 *"Broadband Coverage in Europe"*, 2007 Survey, Study by IDATE, p. 86.

Germany

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)	86	91	92	93		89	10
DSL coverage in rural areas (as % of total population)			55	59		72	15
Broadband penetration (as % of population)	5.7	8.4	12.8	18.1	23.8	20.0	8
DSL penetration (as % of population)	5.5	8.1	12.4	17.3	22.5	16.0	3
Predominant download speed				512 Kbps-1 Mbps	512 Kbps-1 Mbps		
% of households with an internet connection			62	67	71	54	5
Households with broadband as % of households with internet			38	50	70	77	20
% of enterprises with broadband access	42	54	62	73	80	77	10
Internet usage							
% population who are regular internet users			54	59	64	51	7
Take up of internet services (as % of population)							
sending emails				60	64	48	6
looking for information about goods and services				60	63	47	6
Internet telephoning or videoconferencing				10	13	10	8
playing/downloading games and music				18	21	22	16
listening to the web radio/watching web tv				12	15	15	14
reading online newspapers/magazines				19	21	21	16
internet banking				32	35	25	7
eGovernment indicators							
% basic public services for citizens fully available online	17	27		27	64	51	8
% basic public services for enterprises fully available online	75	75		75	88	72	5
% of population using e-Government services				32	43	30	6
of which for returning filled in forms				9	17	13	9
% of enterprises using e-Government services	35	36	44	49	56	65	20
of which for returning filled in forms	14	17	24	37	43	45	17
e-Health							
% of GPs with broadband connection					40	48	16
% of GPs with secondary care connection					9	24	21
% of GPS using electronic networks for transfer of patient data					66	48	7
e-Commerce							
e-commerce as % of total turnover of enterprises		11	13	14	11	11	6
% enterprises receiving internet orders	8	16	17	19	25	14	4
% enterprises purchasing on the internet		51	54	54	60	39	2
e-business. % enterprises:							
with integrated internal business processes		38	43	44	52	41	6
with integrated external business processes		14	16	17	19	14	5
using ERP systems					24	17	8
using analytical CRM					30	17	1
sending/receiving e-invoices					19	18	11
using digital signatures					15	16	14
using secure protocols for internet orders					8	5	4
using open sources operating systems					17	12	6
Employment and skills							
% of the population with no internet skills			36	29	26	40	6
% of the population with low internet skills			41	41	41	29	
% of the population with medium internet skills			20	25	27	23	
% of the population with high internet skills			4	5	6	8	21
% of persons employed with ICT user skills.	18.8	18.7	19.1	19.1	18.7	18.2	16
% of persons employed with ICT specialist skills	3.1	3.0	3.2	3.3	3.3	3.1	10
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP	5.3	5.4				5.3	9
ICT sector share of total employment	4.0	4.0				3.8	11
ICT sector growth (constant prices).	3.5	6.4				4.6	4
ICT R&D expenditure by the business sector, as % of GDP	0.39	0.40				0.31	6
=== as % of total R&D expenditure	22.0	22.8				26.3	15
% of ICT exports on total exports	9.7	10.1	9.6	9.2			12

11. Greece

Strong policy commitment, notably the National Digital Strategy (2006-2013), has lead to a stable improvement of most benchmarking indicators. However, despite this, the information society in Greece is still lagging behind in comparison to general developments in the EU.

Broadband

In January 2008, broadband penetration reached 9.1% after significant growth, even though this is still far below EU average (20%). Also broadband coverage remains one of the lowest in the EU. Narrowband is still the dominant form of connection, and low usage of online services reflects low Internet connectivity. The "National Digital Strategy (2006-2013)" has set ambitious objectives to stimulate the growth of broadband markets and align Greece to the EU average by 2010.

Online public services

Greece has made significant advancement over the last year in ***fully-online availability*** and is steadily closing the gap with the EU average. The estimation of ***online sophistication*** results for Greece is 68%. These improvements have been equally balanced between services to citizens and to businesses though both remain below the EU average.

Take-up by citizens is still low. Although it grew by three points in 2007, Greece is ranked 26th. For companies the situation is totally different. Although no figures are available for 2007, during the last three years, usage by Greek firms was consistently above the EU average, 84% in 2006.

ICTs in the economy

Information on the impact of ICTs on the Greek economy is limited with no information available on size and growth of the ICT sector. There has been a steady improvement in the level of ICT skills in the population and in the proportion of ICT users in the workforce but both indicators remain below the EU average.

Greece

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)	2	9	12	18		89	25
DSL coverage in rural areas (as % of total population)			0	10		72	21
Broadband penetration (as % of population)	0.1	0.5	1.4	4.4	9.1	20.0	24
DSL penetration (as % of population)	0.1	0.4	1.4	4.4	9.1	16.0	19
Predominant download speed				up to 512 Kbps	512 Kbps-1 Mbps		
% of households with an internet connection			22	23	25	54	25
Households with broadband as % of households with internet			3	17	29	77	27
% of enterprises with broadband access	13	21	44	58	72	77	19
Internet usage							
% population who are regular internet users			18	23	28	51	26
Take up of internet services (as % of population)							
sending emails			14	17	21	48	26
looking for information about goods and services			17	23	28	47	23
Internet telephoning or videoconferencing			1	2	3	10	27
playing/downloading games and music			8	11	15	22	24
listening to the web radio/watching web tv			4	5	8	15	24
reading online newspapers/magazines			9	14	16	21	22
internet banking			1	2	4	25	25
eGovernment indicators							
% basic public services for citizens fully available online	18	18		17	33	51	18
% basic public services for enterprises fully available online	50	50		50	63	72	17
% of population using e-Government services			7	9	12	30	25
of which for returning filled in forms			3	2	5	13	23
% of enterprises using e-Government services		77	81	84	82	65	8
of which for returning filled in forms	57	45	56	76	77	45	2
e-Health							
% of GPs with broadband connection					44	48	15
% of GPs with secondary care connection					6	24	24
% of GPS using electronic networks for transfer of patient data					7	48	26
e-Commerce							
e-commerce as % of total turnover of enterprises	1	2	2	3	2	11	16
% enterprises receiving internet orders	6	5	6	8	8	14	16
% enterprises purchasing on the internet		13	14	14	14	39	23
e-business. % enterprises:							
with integrated internal business processes	42	39	50	57		41	
with integrated external business processes	12	9	19	15		14	
using ERP systems					31	17	3
using analytical CRM					15	17	13
sending/receiving e-invoices					10	18	22
using digital signatures					6	16	24
using secure protocols for internet orders					2	5	17
using open sources operating systems					11	12	16
Employment and skills							
% of the population with no internet skills			73	65	63	40	25
% of the population with low internet skills			20	23	22	29	
% of the population with medium internet skills			5	9	11	23	
% of the population with high internet skills			1	3	4	8	24
% of persons employed with ICT user skills.	11.7	12.1	12.1	13.0	12.7	18.2	24
% of persons employed with ICT specialist skills	2.2	2.4	2.2	2.1	2.2	3.1	26
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP	3.5	4.0				5.3	21
ICT sector share of total employment	1.7	1.7				3.8	20
ICT sector growth (constant prices).	5.3	19.8				4.6	1
ICT R&D expenditure by the business sector, as % of GDP	0.09	0.10				0.31	16
=== as % of total R&D expenditure	50.7	54.5				26.3	3
% of ICT exports on total exports	1.3	1.4	1.1	2.5			26

12. Hungary

The information society in Hungary is still lagging behind in comparison with the general developments in the EU, with most of the benchmarking indicators below the EU average. However, there are signs that this may be evening out with strong progress in developing eGovernment services and increases in the number of regular Internet users. The national e-Inclusion programme launched in 2007 aims to raise awareness and skills in digital technologies and should further consolidate growth. The strength of the ICT sector and the good eSkill base in the country are also strategic assets for future development.

Broadband

Broadband penetration increased to 14.2% by January 2008, but remains below the EU average of 20%. Households are increasingly connected to the Internet with broadband rather than narrowband and this indicator actually demonstrated a considerable growth from 2006 to 2007. 86% of connected households now have broadband which is well above EU average and ranks Hungary as number 10, three places up from last year. The broadband to narrowband ratio has always been high in Hungary indicating it has managed to leapfrog the older technology.

Usage of online services is growing at a pace generally faster than other Member States. In most indicators Hungary has improved its ranking, especially in Internet telephony/videoconferencing where Hungary has moved from 15 to 9.

Online public services

For all services, the Hungarian ***fully-online availability*** rating caught up with the EU average between 2004 and 2006, but remains unchanged this year at 50% — now 8% below average. Services to citizens have remained close to the EU average but services to enterprises have not kept pace with improvements elsewhere and have fallen 35 percentage points below average. In terms of online sophistication, Hungary is eight points below the average. Only one service out of nine reaches the fifth level of sophistication.

Take-up by citizens and businesses has grown significantly in 2007, although it still remains below the EU average. What is interesting and encouraging is the number of business and citizens sending filled in forms electronically is equal to the EU average.

The Hungarian eGovernment strategy establishes that the Hungarian system of public administration, public services and the administration of justice should operate on the basis of modern principles, focusing upon the needs and requirements of citizens. This should result in better quality services and a more sensible use of available resources. Serving as both an example and a model, a modern system of public administration and government action could become a force promoting the modernisation of society and the fulfilment of democracy.

ICTs in the economy

Hungary has a relatively large ICT sector that contributes nearly a quarter of its exports but does not proportionally invest in ICT-related R&D, enterprise connectivity is low and the use of e-business and e-commerce is generally low. The overall level of skills in the population and the workforce is close to the EU average.

Hungary

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)	58	70	85	89		89	15
DSL coverage in rural areas (as % of total population)			76	77		72	13
Broadband penetration (as % of population)		3.6	6.1	9.9	14.2	20.0	20
DSL penetration (as % of population)		2.4	4.1	6.1	7.5	16.0	20
Predominant download speed				512 Kbps-1 Mbps	512 Kbps-1 Mbps		
% of households with an internet connection			22	32	38	54	23
Households with broadband as % of households with internet			49	68	86	77	8
% of enterprises with broadband access			48	61	70	77	20
Internet usage							
% population who are regular internet users			34	42	49	51	16
Take up of internet services (as % of population)							
sending emails			31	37	47	48	14
looking for information about goods and services			25	35	43	47	14
Internet telephoning or videoconferencing			4	8	13	10	9
playing/downloading games and music			17	22	27	22	9
listening to the web radio/watching web tv			7	12	16	15	13
reading online newspapers/magazines			18	25	28	21	8
internet banking			6	8	12	25	23
eGovernment indicators							
% basic public services for citizens fully available online	0	8		50	50	51	14
% basic public services for enterprises fully available online		25		50	50	72	21
% of population using e-Government services			18	17	25	30	14
of which for returning filled in forms			7	5	13	13	11
% of enterprises using e-Government services		35		45	55	65	21
of which for returning filled in forms		23		28	44	45	16
e-Health							
% of GPs with broadband connection					36	48	20
% of GPs with secondary care connection					12	24	17
% of GPS using electronic networks for transfer of patient data					15	48	22
e-Commerce							
e-commerce as % of total turnover of enterprises			3	7	6	11	12
% enterprises receiving internet orders		6	5	11	6	14	22
% enterprises purchasing on the internet		14	5	12	19	39	21
e-business. % enterprises:							
with integrated internal business processes		34		5	12	41	26
with integrated external business processes		5	1	5	6	14	22
using ERP systems					8	17	26
using analytical CRM					5	17	27
sending/receiving e-invoices					4	18	27
using digital signatures					13	16	17
using secure protocols for internet orders					1	5	23
using open sources operating systems					14	12	9
Employment and skills							
% of the population with no internet skills			62	52	46	40	17
% of the population with low internet skills			19	23	22	29	
% of the population with medium internet skills			16	19	24	23	
% of the population with high internet skills			3	7	8	8	17
% of persons employed with ICT user skills.	19.5	19.9	20.0	20.1	19.8	18.2	9
% of persons employed with ICT specialist skills	3.2	2.9	2.6	2.9	2.7	3.1	19
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP	7.6	7.9				5.3	4
ICT sector share of total employment	5.4	5.3				3.8	3
ICT sector growth (constant prices).	5.9	8.6				4.6	2
ICT R&D expenditure by the business sector, as % of GDP	0.05	0.05				0.31	19
=== as % of total R&D expenditure	15.1	12.7				26.3	21
% of ICT exports on total exports	16.1	23.0	23.3	23.0			3

13. Ireland

Ireland provides a mixed image of information society developments, among the frontrunners for e-commerce but a level of connectivity and usage of ICTs by citizens and businesses very close to the EU average.

Broadband

In 2007, broadband penetration reached 17.4% of the population, a large increase from 12.3% a year before, thereby catching up with the EU27 average of 20%.

The growth in broadband take-up has also boosted the ratio of broadband to narrowband. This figure doubled to a 54% but still narrowband is very widespread in Ireland. This is reflected in the usage of online services where Ireland is close to the EU average on low bandwidth consuming services like e-mail, Internet banking and search of information about goods and services. On the more bandwidth consuming services Ireland is placed among the lowest ranking countries.

Online public services

Ireland is around the EU27 average for ***online sophistication*** at 78%. On the other hand it shows an unchanged score of 50% for the ***fully-online availability***. The online availability measurement for both services to enterprises and to citizens is below the EU average. Only one out of nine relevant services reaches the fifth level of sophistication.

Figures for take-up are much better. Usage by citizens has grown by six points from 2006 and is now two points above average. Use by companies is very high at 87%, over twenty points above the average. This places Ireland 2nd in the ranking, and it is 4th for businesses sending filled in forms electronically.

In Ireland, ICTs play a significant role in facilitating coordination and greater integration between agencies and in making it easier for business to be set up and to comply with associated compliance procedures. These arrangements between agencies involved, notably the Revenue Commissioners and the Companies Registration Office, ensure that, in most cases, a company may be established within a week.

ICTs in the economy

As a proportion of GDP, Ireland has the second largest ICT sector in Europe and it contributes over a quarter of exports and investment in ICT research is high. Ireland's success attracting inward investment including some major ICT firms may explain this good performance.

ICT skill levels in the general population are not high with notably low, but improving proportions with medium and high Internet skills. Skill levels are also close to the EU average for the workforce. But this has not been an obstacle to a wide adoption of ICTs by businesses: Ireland is a leader for e-commerce and in use of certain e-business applications.

Ireland

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)	61	71	82	86		89	18
DSL coverage in rural areas (as % of total population)			57	64		72	14
Broadband penetration (as % of population)	0.8	3.4	6.7	12.3	17.4	20.0	13
DSL penetration (as % of population)	0.6	2.8	4.9	9.0	12.7	16.0	13
Predominant download speed				512 Kbps-1 Mbps	512 Kbps-1 Mbps		
% of households with an internet connection			47	50	57	54	11
Households with broadband as % of households with internet			16	26	54	77	24
% of enterprises with broadband access	19	32	48	61	68	77	22
Internet usage							
% population who are regular internet users			31	44	51	51	14
Take up of internet services (as % of population)							
sending emails			31	45	48	48	13
looking for information about goods and services			29	42	44	47	13
Internet telephoning or videoconferencing			3	6	7	10	22
playing/downloading games and music			6	11	13	22	26
listening to the web radio/watching web tv			4	9	10	15	22
reading online newspapers/magazines			4	8	10	21	25
internet banking			13	21	24	25	13
eGovernment indicators							
% basic public services for citizens fully available online	50	30		30	40	51	17
% basic public services for enterprises fully available online	63	75		75	63	72	17
% of population using e-Government services			18	26	32	30	9
of which for returning filled in forms			9	14	19	13	6
% of enterprises using e-Government services		69	76	84	89	65	2
of which for returning filled in forms	24	32	42	56	69	45	4
e-Health							
% of GPs with broadband connection					44	48	14
% of GPs with secondary care connection					23	24	10
% of GPS using electronic networks for transfer of patient data					47	48	9
e-Commerce							
e-commerce as % of total turnover of enterprises	17	18	20	17	19	11	3
% enterprises receiving internet orders	11	22	22	23	22	14	5
% enterprises purchasing on the internet		48	53	56	53	39	8
e-business. % enterprises:							
with integrated internal business processes	32	29	30	35	35	41	15
with integrated external business processes	17	14	13	14	14	14	10
using ERP systems					17	17	15
using analytical CRM					23	17	4
sending/receiving e-invoices					26	18	6
using digital signatures					15	16	16
using secure protocols for internet orders					8	5	5
using open sources operating systems					10	12	17
Employment and skills							
% of the population with no internet skills			58	48	42	40	15
% of the population with low internet skills			37	42	42	29	
% of the population with medium internet skills			5	7	12	23	
% of the population with high internet skills			1	3	3	8	25
% of persons employed with ICT user skills.	18.0	19.4	18.8	18.9	18.9	18.2	15
% of persons employed with ICT specialist skills	2.9	2.8	2.6	2.5	2.4	3.1	25
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP	9.8	9.6				5.3	2
ICT sector share of total employment	6.2	6.2				3.8	1
ICT sector growth (constant prices).	-8.5	1.5				4.6	19
ICT R&D expenditure by the business sector, as % of GDP	0.44	0.44				0.31	5
=== as % of total R&D expenditure	57.0	57.1				26.3	2
% of ICT exports on total exports	28.3	27.6	27.3	26.2			2

14. Italy

Italy presents a mixed picture on information society developments. Italy is amongst the leading countries in terms of quality and availability of e-Government services but still below EU average for fixed connectivity, digital skills of the population and use of Internet by households.

Broadband

Broadband penetration increased in 2007, reaching 10.1 million broadband users with a penetration rate of 17.1% in January 2008, below the EU27 average of 20%. DSL still represents the most widely used technology for fixed broadband, although its coverage of rural areas is still limited to 50% of population. This rate is, however, expected to improve as programmes launched by the central government and the local/regional administrations start bearing fruit. Italy is not yet catching up in the use of online services, although the diffusion of mobile technologies is probably reducing this gap.

Complementing the fixed broadband market, the Italian mobile market is still the largest one in the EU and UMTS services have continued to grow, thanks to improved network coverage, the availability of enhanced terminals and the launch of mobile broadband services (HSDPA) and mobile TV (Italy has been one of the first Member States in launching commercial broadcasting services using the DVB-H standard).

Online public services

Italy has made sound progress: it scores a high ***overall sophistication*** of 79% and a progression in ***fully-online availability*** of 70%, coming from 58% — a substantial move to 11th position and it is now above average both for citizen and enterprise services. Four out of five relevant services reach the 5th level of sophistication.

Take-up by citizens is still quite low and has hardly moved in the past years, at nearly half the EU average. However, it is very high for enterprises, at 84% nearly 20 points above the EU average.

The Italian eGovernment strategy focuses on the sharing of common and consistent objectives between all types of administrations (concept of 'cooperative governance'). The aim is to guarantee full administrative interoperability, pursuant to the principle according to which citizens should perceive the public administration as a single entity.

ICTs in the economy

The percentage of businesses with broadband access is around EU average. e-commerce revenues are 2% of turnover compared to the EU average of 11% and almost all e-business applications are applied less than on average in the EU, with the exception of e-invoicing and of integrated internal business processes, where Italy is among the top performers.

Despite robust growth in the percentage of the population with high and medium Internet skills, and the flattening out of growth in low skills, levels in the general population are below average and 58% of the population is estimated to have no Internet skills.

Italy

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)	82	85	87	89		89	16
DSL coverage in rural areas (as % of total population)			45	50		72	18
Broadband penetration (as % of population)	4.1	8.0	11.8	14.5	17.1	20.0	15
DSL penetration (as % of population)	3.7	7.5	11.2	13.9	16.5	16.0	9
Predominant download speed				512 Kbps-1 Mbps	512 Kbps-1 Mbps		
% of households with an internet connection			39	40	43	54	19
Households with broadband as % of households with internet			34	41	58	77	22
% of enterprises with broadband access	31	23	57	70	76	77	17
Internet usage							
% population who are regular internet users			28	31	34	51	24
Take up of internet services (as % of population)							
sending emails			26	29	31	48	23
looking for information about goods and services			21	23	27	47	25
Internet telephoning or videoconferencing			2	3	6	10	25
playing/downloading games and music			10	11	14	22	25
listening to the web radio/watching web tv			5	5	8	15	25
reading online newspapers/magazines			13	13	17	21	20
internet banking			8	9	12	25	21
eGovernment indicators							
% basic public services for citizens fully available online	25	27		36	58	51	9
% basic public services for enterprises fully available online	75	88		88	88	72	5
% of population using e-Government services			14	16	17	30	22
of which for returning filled in forms			4	5	5	13	22
% of enterprises using e-Government services		65	73	87	84	65	6
of which for returning filled in forms	35	35	29	49	35	45	22
e-Health							
% of GPs with broadband connection					49	48	13
% of GPs with secondary care connection					15	24	14
% of GPS using electronic networks for transfer of patient data					16	48	21
e-Commerce							
e-commerce as % of total turnover of enterprises	2	3	2	2	2	11	17
% enterprises receiving internet orders	2	9	3	3	4	14	23
% enterprises purchasing on the internet		14	19	27	29	39	13
e-business. % enterprises:							
with integrated internal business processes	12	33	48	46	53	41	4
with integrated external business processes					11	14	15
using ERP systems					14	17	18
using analytical CRM					15	17	11
sending/receiving e-invoices					34	18	2
using digital signatures					17	16	12
using secure protocols for internet orders					2	5	21
using open sources operating systems					12	12	14
Employment and skills							
% of the population with no internet skills			65	63	58	40	23
% of the population with low internet skills			14	14	15	29	
% of the population with medium internet skills			15	16	18	23	
% of the population with high internet skills			6	7	9	8	11
% of persons employed with ICT user skills.	22.9	17.6	17.6	18.9	19.6	18.2	11
% of persons employed with ICT specialist skills	2.8	2.8	2.9	2.9	2.7	3.1	21
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP	5.4	5.4				5.3	10
ICT sector share of total employment	4.2	4.2				3.8	8
ICT sector growth (constant prices).	1.1	2.9				4.6	14
ICT R&D expenditure by the business sector, as % of GDP	0.13	0.13				0.31	12
=== as % of total R&D expenditure	24.2	25.0				26.3	11
% of ICT exports on total exports	4.0	3.9	3.9	3.8			24

15. Latvia

The information society in Latvia is still lagging behind in comparison with the general developments in the EU with most of the benchmarking indicators below the EU average. However, a good skill base and a wide dissemination of Internet usage in the population are laying the foundations for further development.

Broadband

The number of broadband lines (excluding mobile) in Latvia grew by around 70% over a one year period to reach a penetration rate of 15% in January 2008 (compared to 10.5% a year before). However, Latvia's broadband penetration rate remained well below the EU average of 20%.

The usage of Internet services is, however, rather vibrant and in general at the EU average level in most instances. The use of Internet telephony/videoconferencing is at high level and growing fast. The take-up of broadband by enterprises has however not grown and Latvia falls further behind in this area.

Online public services

Latvia has tripled its overall score for ***fully-online availability***, moving from 10% last year to 30% with services to citizens and to enterprises each improving by a factor of three. This has significantly closed the gap with the EU27 average of 58%. ***Sophistication*** is now 54%. However, not one service of the nine relevant ones reaches the fifth level of sophistication.

Take-up is below the EU average, and in the case of citizens it has actually gone down 7 points from 2006. Enterprises' use has increased by five points in 2007, but is still 20 points below the average.

The overall objectives of Latvia's eGovernment programme are to implement information technology and optimise public administration processes. It aims to improve the quality of government services and reducing the administrative and financial burden for citizens and businesses and to develop a more open and democratic government.

ICTs in the economy

ICTs do not yet play an important part in the Latvian economy. On almost all indicators, the use and investment in ICTs is small. ICT-related R&D makes up only 0.03% of GDP and 4% of exports. Broadband connectivity of enterprises in Latvia is one of the lowest in Europe and e-commerce and use of e-business applications are not widespread. The only exception to this picture is a higher than average level of skills. This is true for the proportion of the population with high and medium Internet skills and the proportion of those employed who have specialist skills.

Latvia

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)				72		89	21
DSL coverage in rural areas (as % of total population)				37		72	19
Broadband penetration (as % of population)		2.4	5.7	10.5	15.0	20.0	18
DSL penetration (as % of population)		1.7	3.0	4.7	6.7	16.0	21
Predominant download speed				up to 512 Kbps	1-2 Mbps		
% of households with an internet connection			31	42	51	54	14
Households with broadband as % of households with internet			46	53	63	77	21
% of enterprises with broadband access		45	48	59	57	77	24
Internet usage							
% population who are regular internet users			36	46	52	51	12
Take up of internet services (as % of population)							
sending emails			33	41	46	48	15
looking for information about goods and services			27	36	39	47	16
Internet telephoning or videoconferencing			8	14	18	10	4
playing/downloading games and music			21	24	27	22	8
listening to the web radio/watching web tv			11	17	20	15	8
reading online newspapers/magazines			24	27	18	21	18
internet banking			16	22	28	25	12
eGovernment indicators							
% basic public services for citizens fully available online	0	8		8	25	51	21
% basic public services for enterprises fully available online		0		13	38	72	25
% of population using e-Government services			13	25	18	30	21
of which for returning filled in forms			5	6	6	13	21
% of enterprises using e-Government services		40	35	40	45	65	26
of which for returning filled in forms		15	15	21	26	45	25
e-Health							
% of GPs with broadband connection					58	48	10
% of GPs with secondary care connection					0	24	27
% of GPS using electronic networks for transfer of patient data					1	48	27
e-Commerce							
e-commerce as % of total turnover of enterprises			1	1	2	11	18
% enterprises receiving internet orders			2	3	4	14	24
% enterprises purchasing on the internet			7	13	14	39	24
e-business. % enterprises:							
with integrated internal business processes		15	17	15	13	41	25
with integrated external business processes		4	4	5	4	14	26
using ERP systems					5	17	27
using analytical CRM					10	17	22
sending/receiving e-invoices					25	18	7
using digital signatures					13	16	18
using secure protocols for internet orders					1	5	24
using open sources operating systems					11	12	15
Employment and skills							
% of the population with no internet skills			54	48	41	40	13
% of the population with low internet skills			27	29	22	29	
% of the population with medium internet skills			15	17	26	23	
% of the population with high internet skills			3	6	11	8	9
% of persons employed with ICT user skills.	17.3	17.0	17.1	19.1	20.8	18.2	6
% of persons employed with ICT specialist skills	3.0	3.3	3.3	3.3	3.8	3.1	6
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP	7.4	7.2				5.3	5
ICT sector share of total employment	2.5	2.4				3.8	18
ICT sector growth (constant prices).	-10.6	3.1				4.6	12
ICT R&D expenditure by the business sector, as % of GDP	0.02	0.03				0.31	23
=== as % of total R&D expenditure	13.0	16.0				26.3	17
% of ICT exports on total exports	2.6	3.1	3.4	4.1			23

16. Lithuania

Lithuania lags behind with many aspects of information society development, with most of the benchmarking indicators below the EU average. However, fast progression in Internet usage by households and intensive e-commerce activities are laying the foundations for further developments.

Broadband

In October 2007, broadband penetration reached 13.7%, compared to 10.6% a year earlier, but still lags behind the EU27 average of 20%. Broadband services are provided through a number of alternative platforms. The mobile market is well developed in Lithuania and is expected to be a source for future growth in broadband connectivity and use of online services.

Overall growth in take-up of broadband and amongst enterprises is stalling, but households seem to be converting from narrowband faster with now 77% of connected households using broadband. This corresponds with the usage of online services where Lithuania is above EU average in services requiring higher bandwidth, and placed below EU average in the low bandwidth consuming services. As in the other Baltic countries Internet telephoning/ videoconferencing is a major driver of growth.

Online public services

The average score for all public services for ***fully-online availability*** is 35%, well below the average. Online availability of services both to citizens and to enterprises has remained constant over the past few years. ***Online sophistication*** is 12 points below the average. Two out of nine relevant services reach the fifth level of sophistication.

Take-up by citizens lies 12 points below the average, whereas for businesses it is 11 points above. What is significant is that 60% of companies have used eGovernment to send filled in forms, against an EU average of 45%.

The goals of Lithuania's eGovernment strategy are to improve transparency of the decision making process, efficiently deliver high-quality public services and provide information to the public, businesses and institutions by exploiting the possibilities offered by information technology.

ICTs in the economy

ICTs have a minimal impact on the Lithuanian economy. Investment in ICT-related R&D is very small as are exports of ICT products. Enterprise take-up of broadband has not grown, and is well below EU average. Use of ICT tools and online services among enterprises is low with the exception of selling online which is above average. But having a rather good level of digital literacy of the population and basic user skills in the workforce, Lithuania has a sound basis for future developments.

Lithuania

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)			82	83		89	19
DSL coverage in rural areas (as % of total population)			55	58		72	16
Broadband penetration (as % of population)		3.8	6.8	10.6	13.7	20.0	22
DSL penetration (as % of population)		1.5	3.1	5.2	6.4	16.0	22
Predominant download speed				up to 512 Kbps	up to 512 Kbps		
% of households with an internet connection			16	35	44	54	18
Households with broadband as % of households with internet			73	56	77	77	16
% of enterprises with broadband access		50	57	57	53	77	25
Internet usage							
% population who are regular internet users			30	38	45	51	17
Take up of internet services (as % of population)							
sending emails			26	32	39	48	20
looking for information about goods and services			22	30	36	47	19
Internet telephoning or videoconferencing			4	11	19	10	3
playing/downloading games and music			17	24	27	22	7
listening to the web radio/watching web tv			11	17	20	15	9
reading online newspapers/magazines			24	30	32	21	7
internet banking			10	15	21	25	15
eGovernment indicators							
% basic public services for citizens fully available online	0	25		25	25	51	21
% basic public services for enterprises fully available online		63		63	50	72	21
% of population using e-Government services			12	13	18	30	20
of which for returning filled in forms			6	6	11	13	14
% of enterprises using e-Government services		65	72	76	76	65	13
of which for returning filled in forms		30	52	56	60	45	8
e-Health							
% of GPs with broadband connection					33	48	21
% of GPs with secondary care connection					7	24	23
% of GPS using electronic networks for transfer of patient data					27	48	15
e-Commerce							
e-commerce as % of total turnover of enterprises		2	2	5	5	11	14
% enterprises receiving internet orders		5	6	15	15	14	9
% enterprises purchasing on the internet		13	15	22	21	39	17
e-business. % enterprises:							
with integrated internal business processes		19	18	19	23	41	23
with integrated external business processes		7	6	9	10	14	20
using ERP systems					9	17	23
using analytical CRM					9	17	26
sending/receiving e-invoices					15	18	15
using digital signatures					19	16	11
using secure protocols for internet orders					3	5	13
using open sources operating systems					24	12	1
Employment and skills							
% of the population with no internet skills			62	55	49	40	19
% of the population with low internet skills			20	20	18	29	
% of the population with medium internet skills			13	16	20	23	
% of the population with high internet skills			4	9	13	8	4
% of persons employed with ICT user skills.	16.1	17.5	18.3	19.4	21.9	18.2	4
% of persons employed with ICT specialist skills	1.6	2.0	1.5	1.4	1.2	3.1	27
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP	5.6	5.1				5.3	15
ICT sector share of total employment	2.8	2.8				3.8	16
ICT sector growth (constant prices).	5.5	2.3				4.6	16
ICT R&D expenditure by the business sector, as % of GDP	0.02	0.04				0.31	21
=== as % of total R&D expenditure	12.6	22.9				26.3	14
% of ICT exports on total exports	4.6	5.3	4.8	4.4			21

17. Luxembourg

Luxembourg is well advanced in the information society, with many benchmarking indicators significantly above the EU average, in particular in the area of broadband connectivity, households' Internet usage and eSkills endowments.

Broadband

Luxembourg has considerably improved its broadband penetration since last year, reaching 25.4% in January 2008, above the EU27 average of 20%. Take-up of broadband by households and enterprises is growing and limiting the use of narrowband. Growth in the usage of online services is evident and Luxembourg is now first in Europe in Internet telephony/videoconferencing.

Online public services

Although Luxemburg still scores below the EU27 average, its ***fully-online availability*** for all services has made significant progress from a score of 25% in 2006 to 40% in 2007. All this improvement has been in services to citizens.

These discreet results contrast with the figures for take-up. Both for citizens and businesses, Luxembourg is placed 4th in the EU rankings. When it comes to sending filled in forms electronically, the picture gets a bit confusing. 21% of Citizens do so, 8 points above the average. However, only 35% of businesses do so, ten points below the average.

Luxembourg's eGovernment Master Plan sets out the strategic objectives of "eGovernance", which are **transparency**, citizen **inclusion and participation**; public sector **efficiency**, increased **competitiveness** of both the public and private sectors, as well as an increase of the general level of **knowledge** and know-how in Luxembourg. It also aligns the major eGovernment objectives with i2010.

ICTs in the economy

In the wider economy, enterprise use of broadband and of e-business and e-commerce tools is generally close to the EU average. In contrast, skill levels are high both in the general population in the workforce.

Luxemburg

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)	100	100	100	100		89	1
DSL coverage in rural areas (as % of total population)			100	100		72	1
Broadband penetration (as % of population)	3.5	8.1	15.5	21.5	25.4	20.0	7
DSL penetration (as % of population)	3.1	7.2	13.9	19.5	22.8	16.0	2
Predominant download speed				512 Kbps-1 Mbps	512 Kbps-1 Mbps		
% of households with an internet connection			65	70	75	54	4
Households with broadband as % of households with internet			52	63	77	77	14
% of enterprises with broadband access	39	48	64	76	81	77	8
Internet usage							
% population who are regular internet users			63	65	72	51	5
Take up of internet services (as % of population)							
sending emails			63	65	71	48	4
looking for information about goods and services			61	64	68	47	4
Internet telephoning or videoconferencing			11	16	23	10	1
playing/downloading games and music			30	26	33	22	4
listening to the web radio/watching web tv			19	22	29	15	4
reading online newspapers/magazines			29	29	42	21	5
internet banking			37	41	46	25	6
eGovernment indicators							
% basic public services for citizens fully available online	8	8		8	33	51	18
% basic public services for enterprises fully available online	25	38		50	50	72	21
% of population using e-Government services			46	46	52	30	4
of which for returning filled in forms			19	17	21	13	4
% of enterprises using e-Government services	65	71		83	85	65	4
of which for returning filled in forms	25	26		32	35	45	21
e-Health							
% of GPs with broadband connection					62	48	8
% of GPs with secondary care connection					14	24	15
% of GPS using electronic networks for transfer of patient data					27	48	16
e-Commerce							
e-commerce as % of total turnover of enterprises						11	
% enterprises receiving internet orders	9	11			11	14	12
% enterprises purchasing on the internet		33	40		34	39	11
e-business. % enterprises:							
with integrated internal business processes	40	36	45	40	60	41	3
with integrated external business processes	15	16	16	14	28	14	1
using ERP systems					18	17	13
using analytical CRM					13	17	18
sending/receiving e-invoices					23	18	10
using digital signatures					12	16	20
using secure protocols for internet orders					3	5	12
using open sources operating systems					13	12	12
Employment and skills							
% of the population with no internet skills			29	28	21	40	4
% of the population with low internet skills			34	31	28	29	
% of the population with medium internet skills			28	31	37	23	
% of the population with high internet skills			9	10	14	8	3
% of persons employed with ICT user skills.	23.9	26.9	27.3	27.2	28.9	18.2	1
% of persons employed with ICT specialist skills	3.1	3.6	3.6	3.2	4.2	3.1	4
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP						5.3	
ICT sector share of total employment						3.8	
ICT sector growth (constant prices).						4.6	
ICT R&D expenditure by the business sector, as % of GDP		0.12				0.31	14
=== as % of total R&D expenditure	0.0	8.3				26.3	25
% of ICT exports on total exports	15.7	16.4	18.6	18.9			5

18. Malta

Malta is well advanced in information society, with many benchmarking indicators significantly above the EU average.

Broadband

Broadband penetration in Malta in January 2008 was at 16.9%, below the EU25 average of 20%. While in 2006 broadband growth stalled, 2007 saw a substantial increase. Download speeds are rather high in Malta and enterprises are demonstrating a strong growth in broadband take-up, moving Malta four steps up in the EU ranking.

Online public services

Malta has continued to make very marked improvement and sits just behind Austria in second place in the overall country ranking for ***online sophistication*** (96%), and for ***fully online availability*** (95%). The main possibility for improvement is in achieving 5th stage sophistication on some services. Six out of the nine relevant services reach the fifth level of sophistication.

Only 25% of the population use the available online services, a figure below the EU average. Use by businesses is solidly above the EU average, and nearly half of them use eGovernment to send filled in forms electronically.

The Maltese vision for the implementation of eGovernment sets out that eGovernment services should be offered via multiple channels. In this respect, Government is working to offer a (limited) set of services on mobile telephone, via a call centre, through public Internet access points and front offices of Local Councils and Post Offices. The implementation of eGovernment services on digital TV will largely depend on the private sector development progress and its eventual take-up.

ICTs in the economy

Malta has the fourth highest percentage of enterprises connected to broadband of any EU Member State. High connectivity is reflected in the generally high levels of use of e-business applications. e-Commerce is less prevalent with the levels of Internet orders and purchases below the EU average. The importance of ICTs to the Maltese economy is underlined by the fact that it has the highest proportion of ICT exports to total exports in EU27.

Malta

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)	95	95	99	99		89	5
DSL coverage in rural areas (as % of total population)			0	0		72	22
Broadband penetration (as % of population)		9.4	12.7	12.5	16.9	20.0	16
DSL penetration (as % of population)		5.5	7.5	7.4	9.4	16.0	18
Predominant download speed				1-2 Mbps	2-8 Mbps		
% of households with an internet connection			41	53	54	54	12
Households with broadband as % of households with internet			56	77	82	77	11
% of enterprises with broadband access	62		78	83	89	77	4
Internet usage							
% population who are regular internet users			34	36	43	51	19
Take up of internet services (as % of population)							
sending emails			32	31	40	48	19
looking for information about goods and services			27	26	34	47	20
Internet telephoning or videoconferencing			4	4	7	10	23
playing/downloading games and music			14	17	19	22	20
listening to the web radio/watching web tv			8	10	14	15	16
reading online newspapers/magazines			14	17	20	21	17
internet banking			16	16	22	25	14
eGovernment indicators							
% basic public services for citizens fully available online	0	33		83	92	51	2
% basic public services for enterprises fully available online		50		63	100	72	1
% of population using e-Government services			19	17	25	30	15
of which for returning filled in forms			6	4	9	13	16
% of enterprises using e-Government services			68	67	77	65	12
of which for returning filled in forms	36		45	35	49	45	15
e-Health							
% of GPs with broadband connection					51	48	12
% of GPs with secondary care connection					14	24	16
% of GPS using electronic networks for transfer of patient data					17	48	18
e-Commerce							
e-commerce as % of total turnover of enterprises						11	
% enterprises receiving internet orders	21		14	12	13	14	10
% enterprises purchasing on the internet			47	35	36	39	10
e-business. % enterprises:							
with integrated internal business processes			43	47	46	41	9
with integrated external business processes			19	16	14	14	11
using ERP systems					24	17	9
using analytical CRM					22	17	5
sending/receiving e-invoices					24	18	9
using digital signatures					12	16	19
using secure protocols for internet orders					6	5	9
using open sources operating systems					8	12	25
Employment and skills							
% of the population with no internet skills			58	59	53	40	21
% of the population with low internet skills			28	22	22	29	
% of the population with medium internet skills			12	15	19	23	
% of the population with high internet skills			2	4	5	8	22
% of persons employed with ICT user skills.	19.9	20.5	20.4	20.8	21.3	18.2	5
% of persons employed with ICT specialist skills	3.1	4.1	3.3	2.9	3.3	3.1	9
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP	9.1	8.2				5.3	3
ICT sector share of total employment	5.0	5.0				3.8	4
ICT sector growth (constant prices).	-0.1	-11.4				4.6	20
ICT R&D expenditure by the business sector, as % of GDP		0.04				0.31	20
=== as % of total R&D expenditure		9.2				26.3	23
% of ICT exports on total exports	32.7	32.3	26.8	27.6			1

19. Netherlands

The Netherlands is one of the best performing countries in Europe and leads the way in information society developments. The only exceptions are in the supply of eGovernment services.

Broadband

The Netherlands is one of the world's leaders in the broadband ranking along with Denmark and Finland and now stands in third place with 34.2% (October 2007). Growth slowed down in 2007 with an increase on 2.4 percentage points between January and October 2007 compared to over 6 percentage points per year in the three preceding years. One possible explanation is that most (83%) households have an Internet connection and most of these (89%) have broadband.

Good connectivity translates into growth of use of advanced services. The Netherlands is first in Europe in online music and games and also for listening to web radio and watching web TV. The Netherlands also has improved in the use of Internet telephony/videoconferencing. In general, the Netherlands are well above EU average in usage of online services.

Online public services

Fully online availability for The Netherlands yet again increased significantly in 2007, from 53% to 63%. ***Sophistication*** reaches 83%, well above the EU average. It is interesting to note that services for citizens score almost as high as services for businesses. Furthermore, five out of the nine relevant services reach the fifth level of sophistication.

55% of Dutch citizens have used eGovernment in 2007, placing the country 2nd in terms of take-up. It tops the table when it comes to sending filled in forms electronically. Take-up by businesses is also high, at 16 points above the average. They are 3rd in sending filled in forms electronically.

The Dutch Government wishes to take advantage of the opportunities offered by ICTs to improve the standard of service to the business community and the general public. Ultimately, that will mean that citizens may no longer be asked for information which is already available within the Government. The Dutch government acknowledges that ICTs are vital for reducing administrative burdens for citizens and companies. A large part of the administrative reduction comes within range by effective use of ICTs, e.g. by offering online services and reuse of information. The (virtual) infrastructure must be further developed for this reason.

ICTs in the economy

The Netherlands has reached one of the most advanced levels of development of information society without having a strong ICT sector or a high intensity in ICT research. Most other indicators show The Netherlands to be at the forefront of dissemination of ICTs in the economy, for example in use of e-business, in e-commerce and in the high level of ICT skills in the population and in the workforce.

Netherlands

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)	94	99	99	99		89	5
DSL coverage in rural areas (as % of total population)			99	99		72	4
Broadband penetration (as % of population)	11.7	18.9	25.2	31.8	34.2	20.0	3
DSL penetration (as % of population)	6.0	11.6	15.6	19.4	20.7	16.0	6
Predominant download speed				1-2 Mbps	1-2 Mbps		
% of households with an internet connection			78	80	83	54	1
Households with broadband as % of households with internet			69	82	89	77	4
% of enterprises with broadband access	37	54	71	82	87	77	6
Internet usage							
% population who are regular internet users			74	76	81	51	1
Take up of internet services (as % of population)							
sending emails			73	76	79	48	1
looking for information about goods and services			70	73	76	47	1
Internet telephoning or videoconferencing			5	10	21	10	2
playing/downloading games and music			37	42	45	22	1
listening to the web radio/watching web tv			20	28	35	15	1
reading online newspapers/magazines			29	36	40	21	6
internet banking			50	59	65	25	2
eGovernment indicators							
% basic public services for citizens fully available online	18	18		36	55	51	13
% basic public services for enterprises fully available online	38	50		75	75	72	14
% of population using e-Government services			46	52	55	30	2
of which for returning filled in forms			20	30	33	13	1
% of enterprises using e-Government services	41	47	57	70	81	65	9
of which for returning filled in forms	23	27	44	61	73	45	3
e-Health							
% of GPs with broadband connection					82	48	4
% of GPs with secondary care connection					73	24	3
% of GPS using electronic networks for transfer of patient data					91	48	2
e-Commerce							
e-commerce as % of total turnover of enterprises						11	
% enterprises receiving internet orders	17	19	21	28	27	14	2
% enterprises purchasing on the internet		29	35	45	41	39	9
e-business. % enterprises:							
with integrated internal business processes	60	59	61	62	63	41	1
with integrated external business processes	17	20	18	18	17	14	8
using ERP systems					24	17	10
using analytical CRM					14	17	14
sending/receiving e-invoices					11	18	19
using digital signatures					34	16	2
using secure protocols for internet orders					7	5	7
using open sources operating systems					9	12	19
Employment and skills							
% of the population with no internet skills			21	18	16	40	1
% of the population with low internet skills			49	44	39	29	
% of the population with medium internet skills			25	29	33	23	
% of the population with high internet skills			6	9	12	8	5
% of persons employed with ICT user skills.	22.5	20.5	19.6	20.0	19.9	18.2	8
% of persons employed with ICT specialist skills	4.5	4.2	4.3	3.9	3.8	3.1	7
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP	5.2	5.2				5.3	13
ICT sector share of total employment	3.9	3.8				3.8	12
ICT sector growth (constant prices).	0.5	3.0				4.6	13
ICT R&D expenditure by the business sector, as % of GDP	0.37	0.32				0.31	8
=== as % of total R&D expenditure	36.7	31.6				26.3	7
% of ICT exports on total exports	17.0	18.2	20.0	19.0			4

20. Poland

The information society in Poland is still only developing slowly and for all benchmarking indicators Poland is close to the bottom of the EU ranking.

Broadband

Broadband penetration in Poland, at 8.4% in January 2008, was the second lowest in EU27 and far below the average of 20%. Growth in 2007 was relatively slow with an annual increase of 3.2 percentage points. Coverage remains low. However, the number of households with a connection to the Internet is 41%, and of those the majority, 77%, are connected with broadband, which is the consistent with the situation in most of the new Member States. Usage of online services is however growing only slowly.

Online public services

For all online services, Poland's "***fully-available online***" indicator rose from 20% in 2006 to 25% in 2007. All progress was for services to citizens. In terms of online sophistication, Poland is also well below the EU average at 53%. None of the nine relevant services reach the fifth level of sophistication.

Take-up of eGovernment by citizens is half of the EU average, and only four percent use it to send filled in forms electronically. For businesses take-up is higher, at just one point below the EU average. However, they are well above the average when it comes to sending filled in forms electronically.

The activities planned for 2008-2013 aim to launch further services for citizens and enterprises and linking up the different public administration systems. The remodelling of the national data registers is also underway in order to simplify the administrative procedures for enterprises and citizens and create conditions for the development of integrated public services, mortgage register and other records (in line with *one-stop-shop system*).

ICTs in the economy

ICTs have a minimal impact on the Polish economy. Investment in R&D is very small as are exports of ICT products. In comparison to the low level of take-up of ICT in Poland, enterprise use of some e-business applications and e-commerce is relatively high.

Poland

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)		55	62	67		89	23
DSL coverage in rural areas (as % of total population)			52	55		72	17
Broadband penetration (as % of population)		1.4	2.7	5.2	8.4	20.0	26
DSL penetration (as % of population)		1.1	1.9	3.9	5.6	16.0	24
Predominant download speed				512 Kbps-1 Mbps	up to 512 Kbps		
% of households with an internet connection			30	36	41	54	20
Households with broadband as % of households with internet			51	60	72	77	19
% of enterprises with broadband access		28	43	46	53	77	26
Internet usage							
% population who are regular internet users			29	34	39	51	21
Take up of internet services (as % of population)							
sending emails			24	27	32	48	22
looking for information about goods and services			18	25	27	47	24
Internet telephoning or videoconferencing			5	8	10	10	15
playing/downloading games and music			12	16	17	22	21
listening to the web radio/watching web tv			6	10	13	15	19
reading online newspapers/magazines			13	16	15	21	24
internet banking			6	9	13	25	19
eGovernment indicators							
% basic public services for citizens fully available online				8	17	51	25
% basic public services for enterprises fully available online		25		38	38	72	25
% of population using e-Government services			13		15	30	24
of which for returning filled in forms			3		4	13	24
% of enterprises using e-Government services		74	64	61	64	65	18
of which for returning filled in forms		68	60	56	56	45	11
e-Health							
% of GPs with broadband connection					32	48	22
% of GPs with secondary care connection					10	24	19
% of GPS using electronic networks for transfer of patient data					29	48	14
e-Commerce							
e-commerce as % of total turnover of enterprises		3	4	6	6	11	13
% enterprises receiving internet orders		4	4	7	9	14	15
% enterprises purchasing on the internet		10	17	23	22	39	15
e-business. % enterprises:							
with integrated internal business processes		15	18	19	27	41	20
with integrated external business processes		10	6	5	6	14	24
using ERP systems					13	17	20
using analytical CRM					12	17	20
sending/receiving e-invoices					8	18	25
using digital signatures					17	16	13
using secure protocols for internet orders					2	5	16
using open sources operating systems					20	12	3
Employment and skills							
% of the population with no internet skills			59	54	50	40	20
% of the population with low internet skills			22	22	24	29	
% of the population with medium internet skills			14	17	19	23	
% of the population with high internet skills			4	7	7	8	18
% of persons employed with ICT user skills.	14.6	15.1	14.8	15.0	14.9	18.2	23
% of persons employed with ICT specialist skills	2.7	2.8	2.7	2.8	2.9	3.1	14
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP	4.8	4.8				5.3	18
ICT sector share of total employment	2.2	2.2				3.8	19
ICT sector growth (constant prices).	4.2	8.3				4.6	3
ICT R&D expenditure by the business sector, as % of GDP	0.02	0.02				0.31	25
=== as % of total R&D expenditure	12.8	11.6				26.3	22
% of ICT exports on total exports	4.3	4.1	4.2	5.1			20

21. Portugal

Portugal is fairly advanced in the information society with many benchmarking indicators above the EU average. A strong policy commitment to the information society has led to outstanding developments in eGovernment services and a wide availability of broadband networks as well as to a good relative position in eBusiness indicators.

Broadband

Although fixed broadband penetration grew to 16.1% (January 2008), it was still below the EU average (20%). In fact, the Portuguese fixed broadband market has one of the lowest growth rates in the EU, but there are signs of a very dynamic mobile broadband penetration. Also predominant download speeds are among the highest in the EU. The distribution of lines per technology remained constant: DSL constitutes the highest percentage of broadband lines (62.6%), although cable (36.8%) is still a significant means of access.

Usage on online services is in general below the EU average and in 2007 the growth is somewhat mixed, but in general rather slow.

Online public services

Overall, the "***fully available online***" indicator for Portugal has leapfrogged from 60% in 2006 to 90% in 2007 with most of this improvement due to a doubling of the score for citizen services. Services for enterprises reached 100% putting Portugal equal first in the EU. Portugal has also scored very highly in the online sophistication indicator and is 4th in the ranking. Five out of the nine relevant services reach the fifth level of sophistication.

Usage of eGovernment by citizens is still low, and has grown slowly over the years. Progress on specific applications has been reported, such as more than 60% of income tax declarations being filled in online in 2007. Businesses are good users of eGovernment, more so than the EU average. They are also fourth in terms of sending filled in forms electronically.

The Portuguese Government aims to achieve a modern and efficient public administration by defining a number of policy priorities, such as increasing the use of open source software by public sector bodies, generalising the use of Voice over Internet Protocol (VoIP) telephony, providing ICT training to every civil servant, and creating a central e-procurement website. The goal is that all 'basic' public services should be available online and free-of-charge by 2009.

ICTs in the economy

ICTs do not play a major role in the Portuguese economy. Investment in R&D is very small as are exports of ICT products. Enterprise take-up of broadband has grown but remains well below EU average though use of ICT tools and online services among enterprises has progressed but more than by citizens.

Portugal

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)	84	92	93	94		89	9
DSL coverage in rural areas (as % of total population)			79	84		72	8
Broadband penetration (as % of population)	4.8	8.1	11.6	13.9	16.1	20.0	17
DSL penetration (as % of population)	1.8	4.0	6.7	8.8	10.2	16.0	16
Predominant download speed				1-2 Mbps	2-8 Mbps		
% of households with an internet connection			31	35	40	54	21
Households with broadband as % of households with internet			63	68	77	77	17
% of enterprises with broadband access	31	49	63	66	76	77	15
Internet usage							
% population who are regular internet users			28	31	35	51	22
Take up of internet services (as % of population)							
sending emails			26	29	33	48	21
looking for information about goods and services			26	30	33	47	21
Internet telephoning or videoconferencing			3	6	9	10	18
playing/downloading games and music			14	16	21	22	17
listening to the web radio/watching web tv			9	11	14	15	15
reading online newspapers/magazines			16	16	15	21	23
internet banking			8	10	12	25	22
eGovernment indicators							
% basic public services for citizens fully available online	18	25		42	83	51	5
% basic public services for enterprises fully available online	63	63		88	100	72	1
% of population using e-Government services			14	17	19	30	19
of which for returning filled in forms			9	11	13	13	13
% of enterprises using e-Government services		57	58	60	72	65	16
of which for returning filled in forms	43	50	52	54	66	45	5
e-Health							
% of GPs with broadband connection					32	48	22
% of GPs with secondary care connection					21	24	11
% of GPS using electronic networks for transfer of patient data					13	48	23
e-Commerce							
e-commerce as % of total turnover of enterprises	2	5		8	7	11	11
% enterprises receiving internet orders	2	6	6	5	7	14	18
% enterprises purchasing on the internet		16	19	20	20	39	19
e-business. % enterprises:							
with integrated internal business processes	21	33	37	28	37	41	14
with integrated external business processes					26	14	2
using ERP systems					27	17	7
using analytical CRM					15	17	12
sending/receiving e-invoices					14	18	18
using digital signatures					6	16	25
using secure protocols for internet orders					2	5	20
using open sources operating systems					10	12	18
Employment and skills							
% of the population with no internet skills			63	61	57	40	22
% of the population with low internet skills			20	22	16	29	
% of the population with medium internet skills			13	13	19	23	
% of the population with high internet skills			4	4	8	8	16
% of persons employed with ICT user skills.	12.1	13.4	12.4	12.2	11.7	18.2	25
% of persons employed with ICT specialist skills	2.2	2.1	2.2	2.7	2.8	3.1	18
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP	4.6	4.6				5.3	19
ICT sector share of total employment	1.6	1.7				3.8	21
ICT sector growth (constant prices).	0.1	1.5				4.6	18
ICT R&D expenditure by the business sector, as % of GDP	0.05	0.06				0.31	18
=== as % of total R&D expenditure	21.1	21.9				26.3	16
% of ICT exports on total exports	7.2	6.9	7.4	7.9			13

22. Romania

The information society is at a very early stage of development in Romania which is close to the bottom of the EU rankings for nearly all benchmarking indicators: connectivity, ICT usage by households, enterprise and government.

Broadband

Despite the rapidly increasing broadband take-up (by almost 100% in 2007), broadband penetration in Romania is 9.8% (January 2008) which is 5th lowest in the EU27.

The low xDSL penetration ratio means numerous broadband platforms are being deployed and this gives hope for platform competition as a future driver of broadband growth.

The low take-up of broadband is reflected in usage of online services for which Romania is one of the lowest ranking countries.

Online public services

Measured for the first time in 2007, 35% of the services in Romania are ***fully available online,*** with a very large difference between services for businesses and services for citizens. The ***online sophistication*** indicator scores 57%, and two out of nine relevant services reach the fifth level of sophistication.

Take-up of eGovernment is very low, particularly for citizens: only 5% have used eGovernment in 2007. Businesses fare better, but are still more than twenty points below the EU average.

eGovernment has been actively promoted in the last years in Romania, being considered the best way of organising public management in order to increase efficiency, transparency, accessibility and responsiveness to citizens, while reducing bureaucracy and corruption.

ICTs in the economy

ICTs still play a limited role in the Romanian economy. Enterprise connectivity to broadband was 37% in December 2007, one of the lowest figures in Europe and less than half the EU average. Low connectivity results in low levels of e-commerce and low use of e-business applications. The level of digital literacy and eSkills is also the lowest of the EU.

Romania

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)						89	
DSL coverage in rural areas (as % of total population)						72	
Broadband penetration (as % of population)				5.0	9.8	20.0	23
DSL penetration (as % of population)				0.5	1.7	16.0	27
Predominant download speed							
% of households with an internet connection				14	22	54	26
Households with broadband as % of households with internet				37	36	77	26
% of enterprises with broadband access		7		31	37	77	27
Internet usage							
% population who are regular internet users				18	22	51	27
Take up of internet services (as % of population)							
sending emails				16	20	48	27
looking for information about goods and services				10	12	47	27
Internet telephoning or videoconferencing				2	4	10	26
playing/downloading games and music				11	12	22	27
listening to the web radio/watching web tv				4	6	15	27
reading online newspapers/magazines				7	9	21	27
internet banking				1	2	25	26
eGovernment indicators							
% basic public services for citizens fully available online					8	51	27
% basic public services for enterprises fully available online					75	72	14
% of population using e-Government services				3	5	30	27
of which for returning filled in forms				1	2	13	27
% of enterprises using e-Government services		31		39	42	65	27
of which for returning filled in forms		12		13	20	45	26
e-Health							
% of GPs with broadband connection					5	48	27
% of GPs with secondary care connection					1	24	26
% of GPS using electronic networks for transfer of patient data					11	48	24
e-Commerce							
e-commerce as % of total turnover of enterprises				1	2	11	19
% enterprises receiving internet orders		2		2	3	14	25
% enterprises purchasing on the internet		2		6	9	39	25
e-business. % enterprises:							
with integrated internal business processes				18	23	41	22
with integrated external business processes				10	13	14	12
using ERP systems					15	17	17
using analytical CRM					14	17	16
sending/receiving e-invoices					15	18	14
using digital signatures					20	16	10
using secure protocols for internet orders					1	5	25
using open sources operating systems					8	12	24
Employment and skills							
% of the population with no internet skills				76	71	40	27
% of the population with low internet skills				14	16	29	
% of the population with medium internet skills				7	10	23	
% of the population with high internet skills				2	2	8	27
% of persons employed with ICT user skills.			8.4	8.7	9.6	18.2	27
% of persons employed with ICT specialist skills			2.4	2.4	2.5	3.1	24
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP						5.3	
ICT sector share of total employment						3.8	
ICT sector growth (constant prices).						4.6	
ICT R&D expenditure by the business sector, as % of GDP						0.31	
=== as % of total R&D expenditure						26.3	
% of ICT exports on total exports	4.9	4.6	5.4	6.6			16

23. Slovakia

The information society in Slovakia is still lagging behind in comparison to general developments in the EU with most of the benchmarking indicators below the EU average. However, Slovakia has strategic advantages for future developments: a strong ICT sector, a general high level of adoption of Internet by the population, and one of the fastest growth rates of regular Internet use. The slow development of broadband, however, remains a constraint.

Broadband

Broadband penetration is at 8.8% (January 2008) only; the third lowest in EU27. Growth in 2007 was slow, reflecting low coverage. However, the source used here does not include mobile broadband and other sources suggest this may be significant in Slovakia. 46% of households are actually connected to the Internet and 57% of them through broadband. Enterprise broadband connectivity is at EU average. Usage of Internet services is rather high, especially usage of Internet telephoning/videoconferencing which is growing rapidly as in many of the other new Member States.

Online public services

Slovakia scores 35% for ***fully-online availability,*** a substantial improvement from 2006. However, there is a large gap between full availability for citizens and for businesses. ***Online sophistication*** is nearly twenty points below the EU average, and again there is considerable difference between citizens and businesses.

Take-up by citizens is down by eight points from 2006, and at 24% it is below average. However, Slovakian businesses come fifth in the rankings.

Slovakia's "National Lisbon Strategy" stresses the role of eGovernment for increasing the country's competitiveness. The primary objective of computerising the public administration was to provide more effective services for citizens and the private sector; on the other hand, the time saved is invested in other productive activities.

ICTs in the economy

Slovakia benefits from a strong ICT sector and a particularly high number of specialist skills in the workforce even if research intensity in ICTs remains below the EU average. However ICTs do not yet have a great impact on the Slovakian economy: enterprises have a below average take-up rate for broadband and their use of e-business applications and e-commerce is correspondingly low. Basic ICT skills in the general population are also around the EU average.

Slovakia

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)	18	44	61	66		89	24
DSL coverage in rural areas (as % of total population)			25	30		72	20
Broadband penetration (as % of population)		1.0	2.6	5.2	8.8	20.0	25
DSL penetration (as % of population)		0.7	1.9	3.4	5.2	16.0	25
Predominant download speed				up to 512 Kbps	1-2 Mbps		
% of households with an internet connection			23	27	46	54	16
Households with broadband as % of households with internet			31	43	57	77	23
% of enterprises with broadband access		25	48	61	76	77	16
Internet usage							
% population who are regular internet users			43	43	51	51	13
Take up of internet services (as % of population)							
sending emails			42	42	50	48	11
looking for information about goods and services			30	33	39	47	17
Internet telephoning or videoconferencing			4	7	12	10	10
playing/downloading games and music			16	18	23	22	14
listening to the web radio/watching web tv			6	8	11	15	20
reading online newspapers/magazines			23	25	25	21	9
internet banking			10	13	15	25	18
eGovernment indicators							
% basic public services for citizens fully available online		8		8	17	51	25
% basic public services for enterprises fully available online		25		38	63	72	17
% of population using e-Government services			27	32	24	30	16
of which for returning filled in forms			7	7	8	13	19
% of enterprises using e-Government services		47	57	77	85	65	5
of which for returning filled in forms		18	16	45	56	45	12
e-Health							
% of GPs with broadband connection					15	48	26
% of GPs with secondary care connection					5	24	25
% of GPS using electronic networks for transfer of patient data					8	48	25
e-Commerce							
e-commerce as % of total turnover of enterprises			0	0	3	11	15
% enterprises receiving internet orders		7	7		7	14	19
% enterprises purchasing on the internet		16	22		19	39	20
e-business. % enterprises:							
with integrated internal business processes		21	26	22	39	41	12
with integrated external business processes		7	9	10	13	14	13
using ERP systems					13	17	19
using analytical CRM					11	17	21
sending/receiving e-invoices					14	18	17
using digital signatures					21	16	9
using secure protocols for internet orders					2	5	18
using open sources operating systems					16	12	8
Employment and skills							
% of the population with no internet skills			43	42	36	40	11
% of the population with low internet skills			39	34	34	29	
% of the population with medium internet skills			15	19	23	23	
% of the population with high internet skills			3	5	7	8	19
% of persons employed with ICT user skills.	15.0	15.7	15.4	15.4	15.5	18.2	22
% of persons employed with ICT specialist skills	2.7	3.0	3.2	3.3	3.6	3.1	8
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP	5.1	5.1				5.3	16
ICT sector share of total employment	4.0	4.1				3.8	9
ICT sector growth (constant prices).	5.8	6.2				4.6	6
ICT R&D expenditure by the business sector, as % of GDP	0.03	0.02				0.31	24
=== as % of total R&D expenditure	7.9	8.6				26.3	24
% of ICT exports on total exports	4.7	6.6	9.4	12.6			9

24. Slovenia

Slovenia is well advanced in the information society: many benchmarking indicators are significantly above the EU average, with a leading position for eGovernment services and significant increases in the last three years in ICT investment by firms.

Broadband

Broadband penetration stands at 17.3% (January 2008), which is below the EU27 average of 20%. Growth in take-up is very much at the level of the EU average both among households and enterprises. The same can be said about the growth in the usage of online services perhaps with the exception of usage of online radio and TV, which grew rather fast from 2006 to 2007, and constitutes a good example that Slovenians are attracted to higher bandwidth consuming services.

Online public services

90% of the basic public services in Slovenia have ***full-online availability***, a remarkable increase compared to 2006, and a substantial increase for the second year. Availability of services to citizens is the 2nd highest in Europe and for services to enterprises it is the 5th highest. ***Online sophistication*** is now close to 100%. Seven out of nine services reach the fifth level of sophistication. What is remarkable in Slovenia's case is that citizens are better served than businesses.

ICTs in the economy

The economic picture is similar to the overall patterns noted above: slightly above average with some particular strengths but also weaknesses. Slovenia is generally above average in use of e-business applications and is in the top ten countries for e-commerce turnover. Broadband connectivity among enterprises is slightly better than the EU average. Skill levels both in the general population and the workforce are close to the EU average.

Slovenia

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)			55	88		89	17
DSL coverage in rural areas (as % of total population)			27	79		72	12
Broadband penetration (as % of population)		5.9	9.8	14.0	17.3	20.0	14
DSL penetration (as % of population)		3.8	6.5	9.7	12.3	16.0	14
Predominant download speed				512 Kbps-1 Mbps	512 Kbps-1 Mbps		
% of households with an internet connection			48	54	58	54	10
Households with broadband as % of households with internet			40	62	76	77	18
% of enterprises with broadband access		62	74	75	79	77	11
Internet usage							
% population who are regular internet users			40	47	49	51	15
Take up of internet services (as % of population)							
sending emails			36	42	44	48	16
looking for information about goods and services			36	42	47	47	12
Internet telephoning or videoconferencing				4	9	10	17
playing/downloading games and music			24	21	25	22	12
listening to the web radio/watching web tv			10	15	23	15	6
reading online newspapers/magazines			20	24	23	21	12
internet banking			12	16	19	25	16
eGovernment indicators							
% basic public services for citizens fully available online		50		58	92	51	2
% basic public services for enterprises fully available online		38		75	88	72	5
% of population using e-Government services			19	30	30	30	11
of which for returning filled in forms				6	6	13	20
% of enterprises using e-Government services		47	72	75	83	65	7
of which for returning filled in forms		36	45	49	61	45	7
e-Health							
% of GPs with broadband connection					54	48	11
% of GPs with secondary care connection					17	24	13
% of GPS using electronic networks for transfer of patient data					23	48	17
e-Commerce							
e-commerce as % of total turnover of enterprises				9	9	11	8
% enterprises receiving internet orders		11	9	12	10	14	13
% enterprises purchasing on the internet		26	26	22	24	39	14
e-business. % enterprises:							
with integrated internal business processes		21	20	20	33	41	17
with integrated external business processes		6	9	7	12	14	14
using ERP systems					28	17	6
using analytical CRM					14	17	17
sending/receiving e-invoices					7	18	26
using digital signatures					50	16	1
using secure protocols for internet orders					7	5	8
using open sources operating systems					13	12	10
Employment and skills							
% of the population with no internet skills				46	41	40	14
% of the population with low internet skills			30	27	25	29	
% of the population with medium internet skills			17	19	23	23	
% of the population with high internet skills				8	10	8	10
% of persons employed with ICT user skills.	20.0	19.6	19.6	19.2	19.1	18.2	14
% of persons employed with ICT specialist skills	2.6	2.6	2.8	3.0	3.1	3.1	12
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP	5.2	5.2				5.3	12
ICT sector share of total employment	3.6	3.6				3.8	13
ICT sector growth (constant prices).	6.9	5.3				4.6	7
ICT R&D expenditure by the business sector, as % of GDP	0.16	0.15				0.31	11
=== as % of total R&D expenditure	19.2	15.8				26.3	18
% of ICT exports on total exports	4.4	4.2	3.7	3.6			25

25. Spain

Spain is fairly advanced in the information society, with many benchmarking indicators above the EU average, notably in the area of eGovernment services and availability of broadband networks. However general ICT usage by businesses and households is still below the EU average and progress is slow.

Broadband

The number of broadband lines has continued to grow during the last year though at a slower pace than the EU average: broadband penetration increased from 15.2% in December 2006 to 18.3% in January 2008, but this is below the EU27 average (20%). Almost four out of five broadband lines are DSL and the other main technology platform used is cable. While households are connected to the Internet on a lower level than the rest of the EU, Spanish enterprises enjoy a high level of broadband connections, second in the EU. Usage on online services is very much at the level of the EU average. Online gaming, music and newspapers are among the most popular activities.

Online public services

Spain performed above the EU27 average in almost all areas measured in the 2007 survey of online services, a considerable advance after a period of limited progress. Overall, the ***fully-online availability*** score is 70%, a significant step up compared to last year's 55%. ***Sophistication*** of online services is also above the EU average.

In terms of take-up, however, Spain's performance is still slightly below the average with no noticeable growth over the past years.

Reaching a fully developed eGovernment is among the key objectives of Plan Avanza, Spain's Information Society Strategy. The Spanish government has opted for of a user-centric eGovernment that also overcomes the most serious problems faced by eServices that are offered by Spanish administrations: their uneven development and quality as well as their lack of integration when these services are offered by different administrations or departments.

ICTs in the economy

The indicators reveal an economy that is generally lagging behind in use of ICTs, with low take-up of e-commerce or use of e-business applications. Broadband connectivity of enterprises is, however, 90% which is the second highest proportion in Europe. ICT skills in the Spanish population and the workforce are similar to the EU average.

Spain

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)	85	87	89	90		89	13
DSL coverage in rural areas (as % of total population)			82	86		72	7
Broadband penetration (as % of population)	5.3	8.0	11.7	15.2	18.3	20.0	12
DSL penetration (as % of population)	4.0	6.1	9.1	12.0	14.4	16.0	11
Predominant download speed				512 Kbps-1 Mbps	512 Kbps-1 Mbps		
% of households with an internet connection			36	39	45	54	17
Households with broadband as % of households with internet			58	75	88	77	5
% of enterprises with broadband access	51	72	76	87	90	77	2
Internet usage							
% population who are regular internet users			35	39	44	51	18
Take up of internet services (as % of population)							
sending emails			34	37	42	48	17
looking for information about goods and services			33	38	42	47	15
Internet telephoning or videoconferencing			4	6	8	10	21
playing/downloading games and music			20	23	25	22	11
listening to the web radio/watching web tv			24		17	15	12
reading online newspapers/magazines					24	21	10
internet banking			14	15	16	25	17
eGovernment indicators							
% basic public services for citizens fully available online	33	33		33	58	51	9
% basic public services for enterprises fully available online	75	88		88	88	72	5
% of population using e-Government services				25	26	30	13
of which for returning filled in forms			6	7	8	13	17
% of enterprises using e-Government services	44	50	55	58	58	65	19
of which for returning filled in forms	26	32	35	38	38	45	19
e-Health							
% of GPs with broadband connection					36	48	19
% of GPs with secondary care connection					30	24	9
% of GPS using electronic networks for transfer of patient data					37	48	12
e-Commerce							
e-commerce as % of total turnover of enterprises	2	3	3	7	9	11	9
% enterprises receiving internet orders	1	2	2	8	8	14	17
% enterprises purchasing on the internet		9	10	16	18	39	22
e-business. % enterprises:							
with integrated internal business processes	36	13	26	33	30	41	19
with integrated external business processes	8	5	8	13	11	14	16
using ERP systems					13	17	21
using analytical CRM					15	17	9
sending/receiving e-invoices					9	18	24
using digital signatures					26	16	6
using secure protocols for internet orders					2	5	19
using open sources operating systems					7	12	27
Employment and skills							
% of the population with no internet skills				49	44	40	16
% of the population with low internet skills				27	23	29	
% of the population with medium internet skills				20	25	23	
% of the population with high internet skills				4	8	8	12
% of persons employed with ICT user skills.	15.3	15.7	15.6	15.5	15.8	18.2	21
% of persons employed with ICT specialist skills	2.4	2.7	2.6	2.7	2.9	3.1	17
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP	4.1	4.0				5.3	20
ICT sector share of total employment	2.5	2.5				3.8	17
ICT sector growth (constant prices).	2.7	2.8				4.6	15
ICT R&D expenditure by the business sector, as % of GDP	0.08	0.08				0.31	17
=== as % of total R&D expenditure	14.3	14.3				26.3	19
% of ICT exports on total exports	5.0	4.6	4.6	4.4			22

26. Sweden

Sweden is among the top nations for information society development and is firmly within the group of leading countries in European Union. It also has a competitive and dynamic ICT sector.

Broadband

In January 2008, Swedish broadband penetration in terms of lines per 100 inhabitants was 31.2%, the fourth highest figure in the EU. Broadband connectivity of enterprises showed no growth, which is similar to the other Nordic countries, perhaps indicating it has reached a level of saturation. This might also explain the lack of growth in the usage of online services. From 2006 to 2007 usage actually declined in the low bandwidth consuming services like emails, search for goods and services, but a small growth was reported in high bandwidth consuming services like online TV, radio, games and music.

Online public services

75% of the services to citizens and to businesses in Sweden are ***fully available online***. Sweden's advancement over recent years has been minimal and it has dropped from its leading position in earlier years. This decline appears to be due to a fall in the availability of services to enterprises. ***Online sophistication*** of public services scores 87%. Four of the nine relevant services reach the fifth level of sophistication. Take-up in Sweden is in line with the results above. Usage by citizens and businesses is firmly above the average, including the sending of filled in forms electronically.

The goal of the Swedish Government is to establish a Public Administration which is open the 24 hours. An important aim is also to strengthen democracy by enhanced transparency and citizen participation in the policy-making and decision-making processes. Also, a multi-channel approach should be offered, and websites must have a design and a language that ensures access for everyone.

ICT in the Economy

Sweden has a large ICT sector and is one of the leading countries for use of ICT in the economy. The importance of ICT to business is underlined by the high proportion of ICT specialists in the work force and by the very high levels of expenditure on R&D, the second highest in Europe as a percentage of GDP. Enterprise broadband connectivity rate is nearly 90% and Sweden is one of Europe's leaders in e-commerce. It is also above average in use of nearly all e-business applications. Against this background, it is perhaps surprising that the level of Internet skills in the general population is not higher. There are less than average numbers with no Internet skills but an excess of people with low skills and only average numbers with medium and high skills.

Sweden

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)		91	93	95		89	8
DSL coverage in rural areas (as % of total population)			66	84		72	8
Broadband penetration (as % of population)	11.3	15.4	20.7	25.9	31.2	20.0	4
DSL penetration (as % of population)	6.6	9.8	13.9	17.1	19.3	16.0	8
Predominant download speed				up to 512 Kbps	up to 512 Kbps		
% of households with an internet connection			73	77	79	54	2
Households with broadband as % of households with internet			55	66	85	77	10
% of enterprises with broadband access	62		83	89	87	77	5
Internet usage							
% population who are regular internet users			76	80	75	51	3
Take up of internet services (as % of population)							
sending emails			67	74	69	48	5
looking for information about goods and services			70	74	70	47	2
Internet telephoning or videoconferencing			4	9	9	10	19
playing/downloading games and music			31	34	35	22	2
listening to the web radio/watching web tv			21	28	33	15	3
reading online newspapers/magazines			39	41	43	21	4
internet banking			51	57	57	25	4
eGovernment indicators							
% basic public services for citizens fully available online	55	64		64	75	51	7
% basic public services for enterprises fully available online	86	88		88	75	72	14
% of population using e-Government services			52		53	30	3
of which for returning filled in forms			21		24	13	3
% of enterprises using e-Government services		92	80	80	79	65	11
of which for returning filled in forms	40	53	48	53	55	45	13
e-Health							
% of GPs with broadband connection					88	48	3
% of GPs with secondary care connection					47	24	6
% of GPS using electronic networks for transfer of patient data					89	48	5
e-Commerce							
e-commerce as % of total turnover of enterprises	12			14	14	11	5
% enterprises receiving internet orders	9	19	22	23	26	14	3
% enterprises purchasing on the internet		68	67	70	72	39	1
e-business. % enterprises:							
with integrated internal business processes	23	25	25	28	37	41	13
with integrated external business processes	6	9	8	9	11	14	17
using ERP systems					32	17	2
using analytical CRM					22	17	6
sending/receiving e-invoices					18	18	13
using digital signatures					23	16	8
using secure protocols for internet orders					10	5	2
using open sources operating systems					8	12	22
Employment and skills							
% of the population with no internet skills			33	18	22	40	5
% of the population with low internet skills			52	48	45	29	
% of the population with medium internet skills			14	26	25	23	
% of the population with high internet skills			1	8	8	8	15
% of persons employed with ICT user skills.	19.3	20.0	18.9	19.5	19.5	18.2	13
% of persons employed with ICT specialist skills	4.7	4.4	4.9	4.9	4.9	3.1	1
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP	6.3					5.3	
ICT sector share of total employment	5.5					3.8	
ICT sector growth (constant prices).						4.6	
ICT R&D expenditure by the business sector, as % of GDP	1.11	1.06				0.31	2
=== as % of total R&D expenditure	37.8	37.8				26.3	5
% of ICT exports on total exports	10.3	11.2	11.2	10.7			11

27. United Kingdom

The United Kingdom is one of the best performing countries in Europe, with most of the benchmarking indicators above the EU average. Progress is also very fast in areas where the UK has a relative comparative advantage, namely the supply of eGovernment services and the use of Internet by households.

Broadband

The UK broadband market has seen another year of solid growth. The total number of fixed broadband lines increased to approximately 14.5 million in July 2007, and by January 2008, broadband penetration was 25.7%, position 5 among the EU27. Although growth in 2007 was impressive, it was less than in 2006 but it remains above the EU average.

The same might be said for growth in the usage of online services which is rather limited. In general, usage is above EU average except for Internet telephony/ videoconferencing where the rapid growth in usage in some new Member States has pushed the UK down below the average.

Online public services

Overall, 89% of the basic public services in the UK are ***fully available online,*** which is a marked improvement over 2006 particularly in services to enterprises. ***Online sophistication*** of public services scores 90%. Four of the nine relevant services reach the fifth level of sophistication, one more than the EU average. Take-up by citizens is slightly above the EU average. Businesses, however, lag behind in using eGovernment: 54% do so, against a 65% EU average.

The UK government strategy is about better using technology to deliver public services and policy outcomes that have an impact on citizens' daily lives: through greater choice and personalisation, delivering better public services, such as health, education and pensions; benefiting communities by reducing burdens on front line staff and giving them the tools to help break cycles of crime and deprivation; and improving the economy through better regulation and leaner government.

ICTs in the economy

The economic aspects of information society are not quite as well developed as broadband and public services. Investment in ICT research is below the EU average. The UK also generally lags behind in use of e-business applications. e-commerce, however, is a strength and the UK is the second highest country for e-commerce turnover. There are slightly higher levels of ICT skills in the work force but the population skill levels are close to the EU average.

United Kingdom

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)	85	95	99	99		89	4
DSL coverage in rural areas (as % of total population)			95	95		72	6
Broadband penetration (as % of population)	5.3	10.2	16.5	21.7	25.7	20.0	5
DSL penetration (as % of population)	3.0	7.0	12.1	16.6	20.1	16.0	7
Predominant download speed				1-2 Mbps	1-2 Mbps		
% of households with an internet connection			60	63	67	54	7
Households with broadband as % of households with internet			52	70	85	77	9
% of enterprises with broadband access	27	50	65	77	78	77	13
Internet usage							
% population who are regular internet users			54	57	65	51	6
Take up of internet services (as % of population)							
sending emails			57	53	61	48	7
looking for information about goods and services			57	55	62	47	7
Internet telephoning or videoconferencing			5	7	8	10	20
playing/downloading games and music			23	24	26	22	10
listening to the web radio/watching web tv			15	15	18	15	10
reading online newspapers/magazines			24	23	22	21	15
internet banking			27	28	32	25	10
eGovernment indicators							
% basic public services for citizens fully available online	55	60		80	91	51	4
% basic public services for enterprises fully available online	43	57		57	88	72	5
% of population using e-Government services			24		38	30	8
of which for returning filled in forms			5		18	13	7
% of enterprises using e-Government services		34	39	52	54	65	22
of which for returning filled in forms	7	12	19	38	40	45	18
e-Health							
% of GPs with broadband connection					73	48	6
% of GPs with secondary care connection					52	24	5
% of GPS using electronic networks for transfer of patient data					91	48	4
e-Commerce							
e-commerce as % of total turnover of enterprises	12	14	16	17	19	11	2
% enterprises receiving internet orders	9	13	15	19	17	14	8
% enterprises purchasing on the internet		45	54	62	59	39	4
e-business. % enterprises:							
with integrated internal business processes		34	10	15	34	41	16
with integrated external business processes		10	9	11	19	14	4
using ERP systems					8	17	25
using analytical CRM					13	17	19
sending/receiving e-invoices					15	18	16
using digital signatures					0	16	27
using secure protocols for internet orders					9	5	3
using open sources operating systems					7	12	26
Employment and skills							
% of the population with no internet skills				39	29	40	7
% of the population with low internet skills				38	41	29	
% of the population with medium internet skills				18	22	23	
% of the population with high internet skills			7	5	8	8	13
% of persons employed with ICT user skills.	24.3	24.1	24.6	24.7	24.9	18.2	2
% of persons employed with ICT specialist skills	3.2	3.2	3.2	3.2	3.2	3.1	11
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP	6.8	6.7				5.3	6
ICT sector share of total employment	4.8	4.5				3.8	7
ICT sector growth (constant prices).	4.6	4.6				4.6	9
ICT R&D expenditure by the business sector, as % of GDP	0.30	0.25				0.31	10
=== as % of total R&D expenditure	26.7	23.4				26.3	13
% of ICT exports on total exports	11.8	8.0	10.1	13.5			8

28. Iceland

In most connectivity and citizen use indicators, Iceland is the most advanced country in Europe. However, the development of eGovernment services does not match the overall development of information society in the country.

Broadband

Information on Iceland is limited as it is not covered by several of the main sources used in these country profiles. Results that are available show nearly all Icelandic households have a computer and access to the Internet. In 2007, 89% of the households had a computer and 84% of the households had access to the Internet and of those 91% had a broadband connection, meaning narrowband has almost become obsolete. Usage of online services is very high and they lead Europe in use of many of these services.

Online public services

Iceland has achieved an overall 68% ***online sophistication***, with 50% ***fully-online availability***, remaining in 2nd quartile position. Compared to other indicators these are amongst the lowest levels achieved and availability is below the EU27 average for services to citizens and to businesses. Four out of the nine relevant services reach the fifth level of sophistication. However, usage by citizens is very high, almost twice the EU average. There is no data on take-up by enterprises for 2007, but it is worth recalling that in 2006 an impressive 95% of firms used eGovernment, 81% of them for sending filled in forms.

ICTs in the economy

Limited economic information is available for Iceland and the indicators that are measured confirm the generally strong information society development. Enterprise broadband connectivity is very high and skills levels in the general population are high with over half having either high or medium skill levels.

Iceland

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)	90	92	92	92		89	
DSL coverage in rural areas (as % of total population)			79	79		72	
Broadband penetration (as % of population)						20.0	
DSL penetration (as % of population)						16.0	
Predominant download speed					512 Kbps-1 Mbps		
% of households with an internet connection			84	83	84	54	
Households with broadband as % of households with internet			75	87	91	77	
% of enterprises with broadband access	20			95		77	
Internet usage							
% population who are regular internet users			81	84	86	51	
Take up of internet services (as % of population)							
sending emails			75	77	80	48	
looking for information about goods and services			73	76	78	47	
Internet telephoning or videoconferencing			14	18	22	10	
playing/downloading games and music			29	34	36	22	
listening to the web radio/watching web tv			31	43	48	15	
reading online newspapers/magazines			65	67	67	21	
internet banking			61	67	72	25	
eGovernment indicators							
% basic public services for citizens fully available online	18	36		36	42	51	
% basic public services for enterprises fully available online	43	71		63	63	72	
% of population using e-Government services			55	61	59	30	
of which for returning filled in forms			20	27	19	13	
% of enterprises using e-Government services	97			95		65	
of which for returning filled in forms	63			81		45	
e-Health							
% of GPs with broadband connection					86	48	
% of GPs with secondary care connection					50	24	
% of GPS using electronic networks for transfer of patient data					60	48	
e-Commerce							
e-commerce as % of total turnover of enterprises	6			8		11	
% enterprises receiving internet orders	6			29		14	
% enterprises purchasing on the internet				60		39	
e-business. % enterprises:							
with integrated internal business processes	31			41		41	
with integrated external business processes	9			10		14	
using ERP systems						17	
using analytical CRM						17	
sending/receiving e-invoices						18	
using digital signatures						16	
using secure protocols for internet orders						5	
using open sources operating systems						12	
Employment and skills							
% of the population with no internet skills			17	13	12	40	
% of the population with low internet skills			37	35	31	29	
% of the population with medium internet skills			32	36	37	23	
% of the population with high internet skills			13	16	20	8	
% of persons employed with ICT user skills.						18.2	
% of persons employed with ICT specialist skills						3.1	
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP						5.3	
ICT sector share of total employment						3.8	
ICT sector growth (constant prices).						4.6	
ICT R&D expenditure by the business sector, as % of GDP						0.31	
=== as % of total R&D expenditure						26.3	
% of ICT exports on total exports							

29. Norway

Norway is placed among the top nations for information society development and is firmly within the group of leading countries in Europe, in particular for broadband connectivity and usage of Internet by citizens.

Broadband

Norway is one of the most advanced countries for Internet connectivity and 86% of households connected have broadband. Its status as one of the world's leading Internet countries is reflected in high figures for regular use of the more advanced content. Although not included in the EU rankings presented here, Norway would be in the top four for all but one of the activities questioned in the Community ICT survey of households.

Online public services

Following a strong increase in 2006, the "***fully available online***" indicator for Norway increased moderately in 2007, suggesting that fewer new initiatives have been implemented on the level of online public service delivery. Norway drops one place in the overall ranking and now stands in 6th position. Services to enterprises are a particular weakness. ***Online sophistication*** for Norway, based is 10% above the average. Four out of the nine relevant services reach the fifth level of sophistication.

Norwegian citizens are the most avid eGovernment users, at twice the EU average they come top of the league. 26% of them used it to send filled in forms, again twice the EU average. Scores for businesses are solid, but not as remarkable: 71% of them have used eGovernment in 2007, above the average but down three points from 2006.

The Norwegian government's aims for eGovernment are two-fold. On the one hand the users should be offered an open, accessible and consistent public sector featuring integrated and fully digital services. On the other hand resources should be freed up and used more effectively through ICT in order to strengthen public welfare provisions, while reducing administrative burdens.

ICTs in the economy

Limited economic information is available for Norway and the indicators that are measured confirm the generally strong information society development. Enterprises have a steadily growing and high broadband connectivity rate and lead Europe in e-commerce and use of many e-business applications. ICT skills in the general population are high.

Norway

Broadband	2003	2004	2005	2006	2007	EU27	rank
Total DSL coverage (as % of total population)	68	82	88	91		89	
DSL coverage in rural areas (as % of total population)			83	86		72	
Broadband penetration (as % of population)	6.2		18.1	24.3	29.1	20.0	
DSL penetration (as % of population)	4.7		14.7	19.4	22.2	16.0	
Predominant download speed					1-2 Mbps		
% of households with an internet connection			64	69	78	54	
Households with broadband as % of households with internet			65	83	86	77	
% of enterprises with broadband access	47	60	78	86	85	77	
Internet usage							
% population who are regular internet users			74	77	81	51	
Take up of internet services (as % of population)							
sending emails			68	72	76	48	
looking for information about goods and services			67	74	76	47	
Internet telephoning or videoconferencing			8	13	12	10	
playing/downloading games and music			26	37	35	22	
listening to the web radio/watching web tv			24	34	37	15	
reading online newspapers/magazines			60	65		21	
internet banking			62	67	71	25	
eGovernment indicators							
% basic public services for citizens fully available online	40	40		60	80	51	
% basic public services for enterprises fully available online	57	75		88	75	72	
% of population using e-Government services			52	57	60	30	
of which for returning filled in forms			21	28	26	13	
% of enterprises using e-Government services	65	69	84	74	71	65	
of which for returning filled in forms	23	40	59	62	61	45	
e-Health							
% of GPs with broadband connection						48	
% of GPs with secondary care connection					76	24	
% of GPS using electronic networks for transfer of patient data						48	
e-Commerce							
e-commerce as % of total turnover of enterprises	6	8	15	14	18	11	
% enterprises receiving internet orders	12	20	20	25	31	14	
% enterprises purchasing on the internet		47	57	66	66	39	
e-business. % enterprises:							
with integrated internal business processes	31	30	34	34	37	41	
with integrated external business processes	10	12	13	15	18	14	
using ERP systems					12	17	
using analytical CRM					18	17	
sending/receiving e-invoices					29	18	
using digital signatures					9	16	
using secure protocols for internet orders					13	5	
using open sources operating systems					7	12	
Employment and skills							
% of the population with no internet skills			23	20	15	40	
% of the population with low internet skills			39	35	38	29	
% of the population with medium internet skills			28	30	32	23	
% of the population with high internet skills			9	14	14	8	
% of persons employed with ICT user skills.						18.2	
% of persons employed with ICT specialist skills						3.1	
Indicators on growth of ICT sector and R&D							
ICT sector share of total GDP						5.3	
ICT sector share of total employment						3.8	
ICT sector growth (constant prices).						4.6	
ICT R&D expenditure by the business sector, as % of GDP						0.31	
=== as % of total R&D expenditure						26.3	
% of ICT exports on total exports							

Definitions and Sources

Broadband

Total DSL coverage (as % of total population) — Source: European Commission, Broadband coverage in Europe (January 2007). Estimations for the EU include IS and NO.

DSL coverage in rural areas (as % of total population) — Source: European Commission, Broadband coverage in Europe (January 2007). Estimations for the EU include IS and NO.

Broadband penetration: number of total subscriptions to broadband connections (households, enterprises, public sector) by platform (DSL, all others) divided by the number of inhabitants. 3G subscriptions are not included in the total. Source: Communications Committee (COCOM) (1 January 2008). FR, NL, AT, EE, LT: data as at 1 October 2007. NO at 1st July 2007. For 2003 and 2005, data is at 31st December for all the countries except for NO (1st July). Note that COCOM data does not include mobile broadband connections.

Predominant speed — Source: European Commission, Broadband coverage in Europe (31st December 2006).

% of households with an Internet connection — Source: Eurostat survey on ICT use by households

% of households having broadband as % of all households having access to the Internet — Source: Eurostat survey on ICT use by households

% of enterprises with broadband access — Non-financial enterprises only. Source: Eurostat survey on ICT use by enterprises.

Number of 3G subscribers per 100 inhabitants — Source: European Commission, Broadband coverage in Europe (January 2007).

Internet usage

% of population who are regular Internet users — Regular use is at least once per week. Source: Eurostat survey on ICT use by households.

% of population using the Internet for specific activities — Activities: sending emails, looking for information about goods and services, Internet phoning/videoconferencing, etc. Eurostat survey on ICT use by households.

Places of access

% of individuals who have accessed the Internet in the last three months, by place of access (multiple answers allowed) — At home, at work, at educational place and PIAP. Source: Eurostat survey on ICT use by households.

eGovernment indicators

% of basic services fully available online (for households and enterprises) — A public service is considered fully online when the publicly accessible website offers the possibility to completely treat the public service via the website, including decision and delivery. No other formal procedure is necessary for the applicant via "paperwork". Source: *The User Challenge. Benchmarking the Supply of Online Public Services*, European Commission. Data for September 2007

% of population using eGovernment services (in the last three months) — Source: Eurostat survey on ICT use by households.

% of population using eGovernment services for sending filled forms (in the last three months) — Source: Eurostat survey on ICT use by households.

% of enterprises using eGovernment services (in the last year) — Non financial enterprises. Source: Eurostat survey on ICT use by enterprises.

% of enterprises using eGovernment services for sending filled forms (in the last year) — Non financial enterprises. Source: Eurostat survey on ICT use by enterprises.

e-Health

%GPs with Broadband connection — Source*: ICT use among General Practitioners in Europe* European Commission 2008

%GPs with secondary care connection — Source*: ICT use among General Practitioners in Europe* European Commission 2008

%GPs electronically transferring patient data — Source*: ICT use among General Practitioners in Europe* European Commission 2008

e-Commerce

All the data presented in this section refer to the total of non financial enterprises.

e-Commerce as % of total turnover of enterprises — Non financial enterprises. Turnover on the Internet or via other external computer mediated network as % of the total turnover of enterprises. Source: Eurostat survey on the ICT use by enterprises.

% of enterprises receiving orders/purchasing on the Internet — Non financial enterprises. % of enterprises receiving orders/purchasing on the Internet. Source: Eurostat survey on the ICT use by enterprises.

e-Business

All the data presented in this section refer to the total of non financial enterprises.

% of enterprises with integrated internal business processes — % of enterprises having software applications for managing orders linked to other internal IT application. Source: Eurostat survey on ICT use by enterprises. Source: Eurostat survey on ICT use by enterprises.

% of enterprises with integrated external business processes — Non financial enterprises. % of enterprises having software applications for managing orders linked to IT systems of customers/suppliers. Source: Eurostat survey on ICT use by enterprises.

% of enterprises using ERP systems — % of enterprises having use of, in January 2007, an Enterprise Resource Planning (ERP) software package to share information on sales and purchases with other internal functional areas (for example, finance, planning, marketing, etc. ERP consists of one or of a set of software applications that integrate information and processes across the several business functions of the enterprise. Source: Eurostat survey on ICT use by enterprises.

% of enterprises using analytical CRM — % of enterprises having use of, in January 2007, any software application for making analysis of the information about clients for marketing purposes (this is commonly referred to as Customer Relationship Management, e.g. to set prices, make sales promotion, choose distribution channels, etc.). Source: Eurostat survey on ICT use by enterprises.

% of enterprises sending/receiving e-invoices — % of enterprises, in January 2007, sending/receiving e-invoices in a digital format which allows its automatic processing. Source: Eurostat survey on ICT use by enterprises.

% of enterprises using digital signature — % of enterprises, in January 2007, using a digital signature in any message sent, i.e. using encryption methods that assure the authenticity and integrity of the message (uniquely linked to and capable of identifying the signatory and where any subsequent change to the message is detectable). Source: Eurostat survey on ICT use by enterprises.

% of enterprises using secure protocols for Internet orders — % of enterprises, in January 2007, using a secure protocol, such as SSL and TLS, for the reception of orders via Internet, in January 2007. Source: Eurostat survey on ICT use by enterprises.

% of enterprises using open source operating systems — % of enterprises, in January using third party free or open source operating systems, such as Linux (i.e. with its source code available, no copyright cost, and the possibility to modify and/or (re)distribute it) Source: Eurostat survey on ICT use by enterprises.

Employment and skills

% of population with no/low/medium/high Internet skills — Based on the answer to the following question: which of the following Internet related activities have you already carried out? [Copying or moving a file or folder / Using copy and paste tools to duplicate or move information within a document / Using basic arithmetic formulas in a spreadsheet / Compressing (or zipping) files / Connecting and installing new devices, e.g. a printer or a modem / Writing a computer program using a specialised programming language / Connecting computers to a local area network / Detect and solve computer problems (e.g. computer runs slowly)]

No Internet skills (none of the above) Note: ranking for this indicator is inverted (lowest =1)
Low Internet skills (1 or 2 activities)
Medium Internet skills (3 or 4 activities)
High Internet skills (5 or 6 activities)

Source: Eurostat survey on ICT use by households.

% of persons employed with ICT user skills — Based on the OECD definition of ICT user (basic + advanced) skills. Source: Eurostat Labour Force Survey

% of persons employed with ICT specialist skills — Based on the OECD definition of ICT specialist skills. Source: Eurostat Labour Force Survey.

ICT specialists: they have the ability to develop, operate and maintain ICT systems. ICTs constitute the main part of their job — they develop and put in place the ICT tools for others.

Advanced users: competent users of advanced, and often sector-specific, software tools. ICTs are not the main job but a tool.

Basic users: competent users of generic tools (*e.g.* Word, Excel, Outlook, PowerPoint) needed for the information society, eGovernment and working life. Here too, ICTs are a tool, not the main job.

Indicators on the growth of ICT sector and R&D

Growth of the value added by the ICT producing sector, in real terms (at constant prices) — ICT sector including Postal services. EU-25 instead of EU-27 (not available) Source: own estimation from the EU KLEMS database.

ICT sector share on total employment and value added — ICT sector including Postal services. EU-25 instead of EU-27 (not available) Source: own estimation from the EU KLEMS database.

Share of ICT R&D performed by the business sector as % of GDP and as % of total business expenditure in R&D. — EU-25 instead of EU-27 (not available). Source: IPTS (European Commission) — Redict project.

% of ICT exports on total exports: data for Imports and Exports of goods are from the COMEXT database; data for services are from Balance of Payments statistics. Share of all Exports and Imports is calculated comparing the previously mentioned data with data from National Accounts Exports and Imports. Source: Eurostat.

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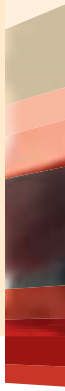

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