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COVER NOTE

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Subject:	COMMISSION STAFF WORKING DOCUMENT "DAE - Scoreboard 2012" (Vol 2/6)

Delegations will find attached Commission document SWD(2012) 180 final. (Vol. 2/6)

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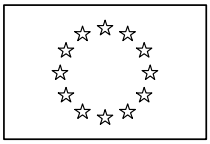


EUROPEAN COMMISSION

Brussels, 18.6.2012
SWD(2012) 180 final

Vol. 2/6

COMMISSION STAFF WORKING DOCUMENT

DAE-Scoreboard 2012

COMMISSION STAFF WORKING DOCUMENT

DAE-Scoreboard 2012

ANNEX I

1. A VIBRANT DIGITAL SINGLE MARKET

- For many indicators on **internet usage** there was a significant slowdown in growth in 2011 compared to previous years. Maintaining the pace of growth is becoming difficult as saturation levels are being reached in some cases and progress is more and more dependent on the catching up of lagging countries and specific socio-economic groups. This affects the number of non-users and regular users as well as the use of particular applications, services and e-commerce.

- Concerning the European Digital Agenda (EDA) target of increasing **regular internet use** to 75% of the population, the confident projections of last year's scoreboard on have been reviewed -- the 75% target will most likely be reached in 2014 and not in 2013, although still ahead of the EDA target year of 2015.

- The target on **cross-border e-commerce** will not be met, while for the overall use of e-commerce, estimates are much more positive. The low use of cross-border e-commerce by individuals is matched by the limited number of enterprises selling electronically.

- Despite the increasing number of internet connected devices per households, there was a decline in 2011 in the number of **individuals buying software, magazines, music or films** online from a peak in 2010.

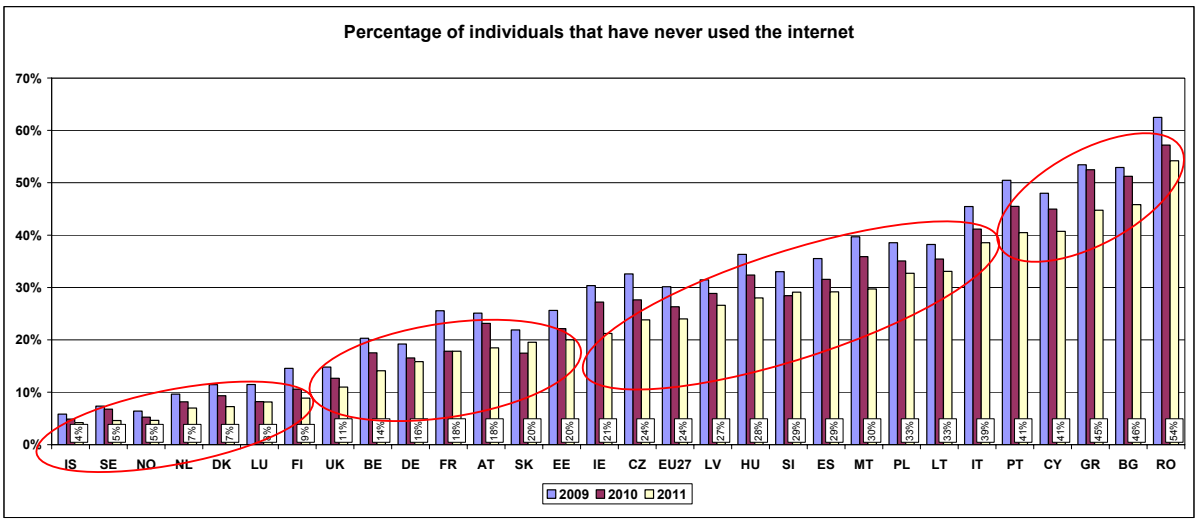
This chapter analyses the latest developments in the use of the internet in the EU. It provides insights into the frequency of use by several socio-economic groups and the kind of services most used by EU internet users.

European Digital Agenda. Key performance targets on digital inclusion:
1. Halve the proportion of the population that has never used the internet by 2015 (to 15%)
2. Increase regular (at least once a week) internet use from 60% to 75% by 2015 and from 41% to 60% for disadvantaged people.

1.1. Population that has never used the internet

The Digital Agenda for Europe calls for a halving of the proportion of the population that has never used the internet (to 15%) by 2015. There continues to be a decrease in the number of people who have never used the internet, falling to 24% of the EU population, a drop of 2 percentage points. This decrease contrasts with 2010, when the average reduction was 4 percentage points (Figure 1).

Figure 1



Source: Eurostat

Around 120 million European citizens have never used the internet. Romania, Bulgaria, Greece, Cyprus and Portugal have the highest rates of non-users but together these five countries have just 25 million people (a figure similar only to Italy with 23 million citizens non-users) that have never used the internet. While Greece experienced the largest reduction rate (-8 percentage points) and Bulgaria and Portugal also had significant reductions (-5), Cyprus (-4) and Romania (-3) had reductions only slightly above the EU average.

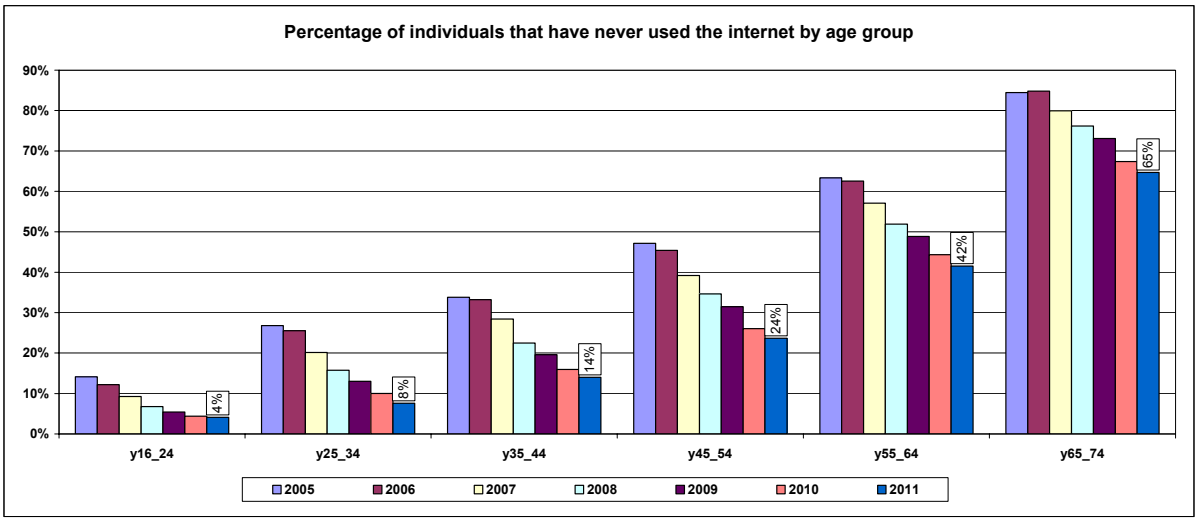
Conversely, the proportion of the population that has never used the internet is almost marginal in the most advanced countries where the number of non-users is below 10% of the population. Despite these small levels, most of these advanced countries also managed to reduce their numbers of non-users, in some cases in the same proportion as the EU average.

Although the gap between Member States in the number of non-users is closing, progress in the last year has slowed down.

Situations are uneven across the largest Member States, which influence the EU average, with the UK over-performing (only 11% of its population has never used the internet), while in Italy, Poland and Spain between 30-40% of the population declare that they have never used the internet (this equates to 49 million people). Germany has reduced its rate by one percentage point to 16%, while in France it appears that no further progress has been made. Altogether the six largest countries account for 80 million out of the total 120 million inexperienced citizens.

For non-users, age is the principal factor with around two thirds of Europeans aged 65-74 and about half of those aged 55-64 having never used the internet (Figure 2). When asked about their reasons for not having an internet connection, lack of interest is the most cited reason (cfr. chapter on skills) and this may be linked to age. Of all households that declared a lack of need to have internet access at home because the content was not useful or not interesting, the largest rates come from households with just one or two adults.. Many national policies aim to increase efforts to promote the benefits of the internet for elderly people. In stark contrast, for the population aged between 16 and 44 years the internet has become a daily tool either for studies, work, leisure or social relations. Only 4% of people aged 16 to 24[1] and just 15% of people aged between 25 and 54 declared that they have never used the internet.

Figure 2



Source: Eurostat

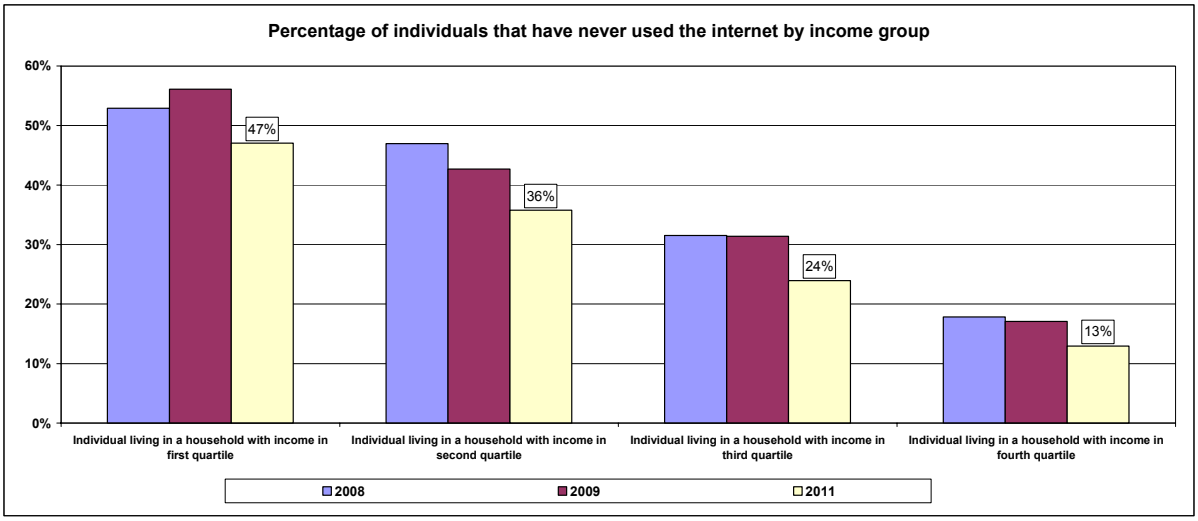
Beyond lack of interest and of skills, equipment and access, costs are the main reasons declared by European households for not having access to the internet. Only 13% of individuals living in a household with income in the fourth quartile have never used the internet against 45% in households with income in the first quartile (Figure 3). This situation has given rise to a discussion on the need to give stimulus to the take-up of internet access by low-income families through special tariffs[2] for internet access, not only in the EU but also in

[1] Only the population aged between 16 years and 74 years is sampled in the statistics on Internet use.

[2] In France the Autorité de la concurrence "welcomes a social tariff for broadband Internet access", http://www.autoritedelaconcurrence.fr/user/standard.php?id_rub=389&id_article=1663. In the US the

the US. Yet, the overall expenditure in information technologies by the EU represented only 2.4% of the European GDP in 2008, far beyond the 2.8% of Japan and the 3.3% of the US.

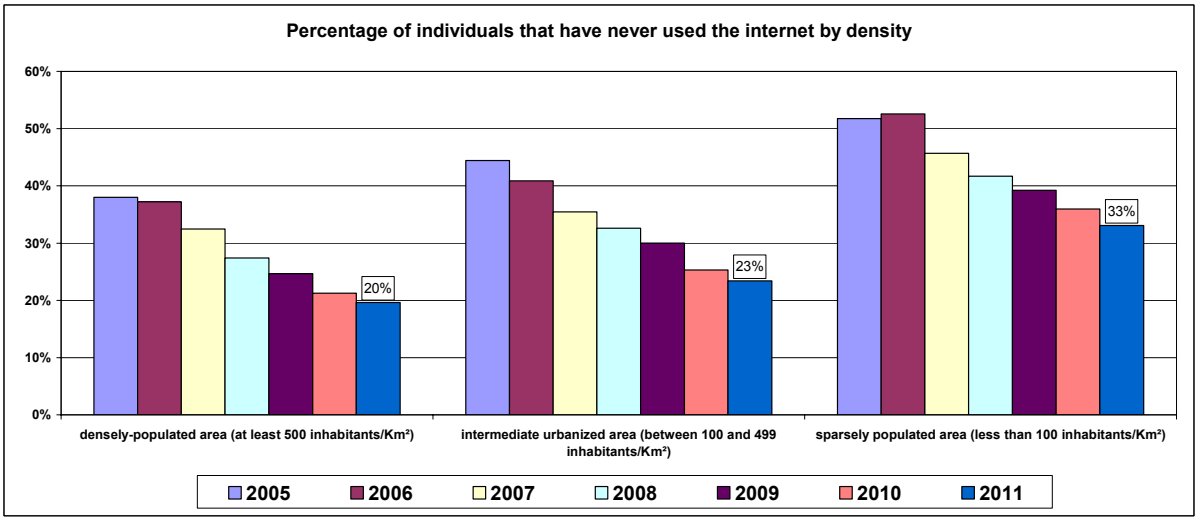
Figure 3



Source: Eurostat

Population density is also a factor to consider, although differences are less strong here. There are basically no differences between densely populated and intermediate urbanized areas, which account for about a quarter of non-users. Sparsely populated areas account for 35% of the non-users (Figure 4). Reduction rates in the last years are comparable in all three types of areas.

Figure 4



Source: Eurostat

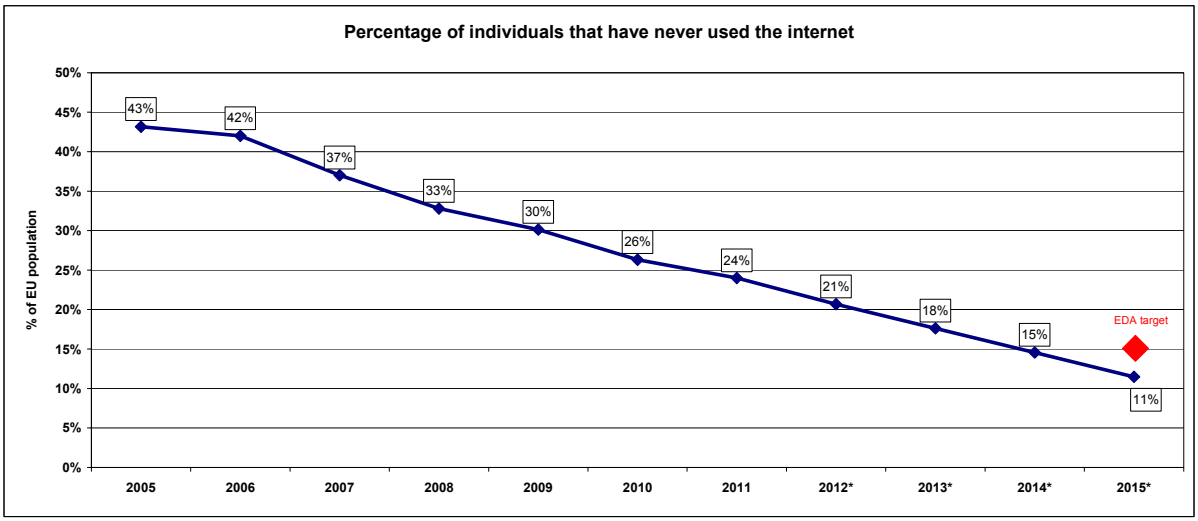
As reported under pillar 4, broadband networks nowadays are widely available in Europe. As a result, non-availability is no longer a reason for not having access to the internet at home at

FCC plans to modernize the low-income broadband Internet access program. http://www.fcc.gov/document/fact-sheet-genachowski-addresses-smart-govt-and-reforms-lifeline

the EU27 level and the problem is concentrated in the sparsely populated areas of a handful of Member States. Similarly, privacy or security concerns are not referred to as a reason for not having internet at home; privacy emerges as more of a concern when it comes to specific uses of the internet such as interaction with public authorities.

Overall, based on the reduction rates of the last three years and if no further slow down is considered, the EDA target could be achieved in 2015 and even earlier if countries lagging behind and some large Member States make an effort in lowering the number of non-users (Figure 5).

Figure 5



Source: Eurostat. *: Projection

1.2. Regular use of the internet

An increasing number of Europeans use the Internet regularly. As the percentage of regular users is relatively high, the increase is slowing down and was lower in 2011 than in previous years. Large disparities still persist between EU countries and between different socio-economic groups.

In 2011, 76% of the EU population had used the internet at least once, an increase of just 2 percentage points from 2010. At a global level, the EU27 is the second largest region behind Asia by number of internet users, with more than 380 million users (Table 1). Relative to its population, the number of internet users is similar to that of the US (78%) and well ahead of other regions. Despite the important rates of use in developed economies, worldwide only 33% of the population is estimated to use the internet.

Table 1- WORLD INTERNET USAGE, December 2011

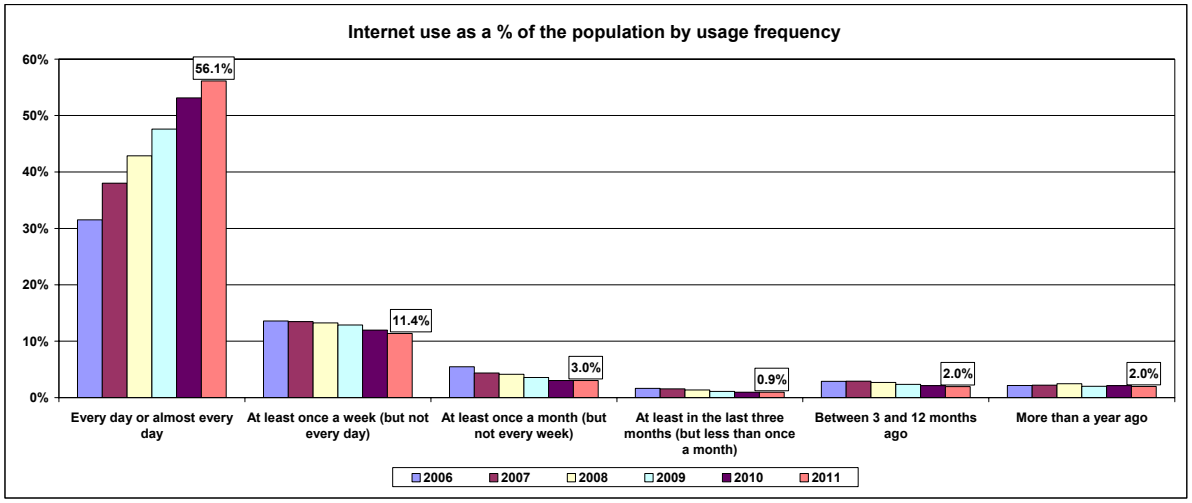
World Regions	Population (2011 Est.)	Internet Users 2011	Penetration (% Population)
Africa	1,037,524,058	139,875,242	13.5%
Asia	3,879,740,877	1,016,799,076	26.2%

EU27	501,000,000	380,760,000	76.00%
Rest of Europe	315,426,346	119,963,686	38.03%
Middle East	216,258,843	77,020,995	35.6 %
North America	347,394,870	273,067,546	78.6 %
Latin America / Carib.	597,283,165	235,819,740	39.5 %
Oceania / Australia	35,426,995	23,927,457	67.5 %
WORLD TOTAL	6,930,055,154	2,267,233,742	32.7 %

Source: Internet World Stats

The slow increase in the number of new users in Europe is accompanied by a slower growth in frequency of use. Regular internet users[3] currently represent 67.5% of the population, only 2.4 percentage points up from 65% in 2010 (Figure 6). This sluggish growth rate contrasts with the average of the previous five years (around 5 percentage points up per year). This also means that the confident projections of last year's scoreboard[4] may not be realised and that the European Digital Agenda target of increasing regular internet use to 75% of the population will not be reached in 2012, but more likely in 2014, although still ahead of the target year of 2015. These new data corroborate the analysis of the 2011 DAE scoreboard which indicated that maintaining the pace of growth would not be easy as saturation levels were being reached in some cases and progress more and more depends on the catching up of lagging countries and socio-economic groups.

Figure 6



Source: Eurostat

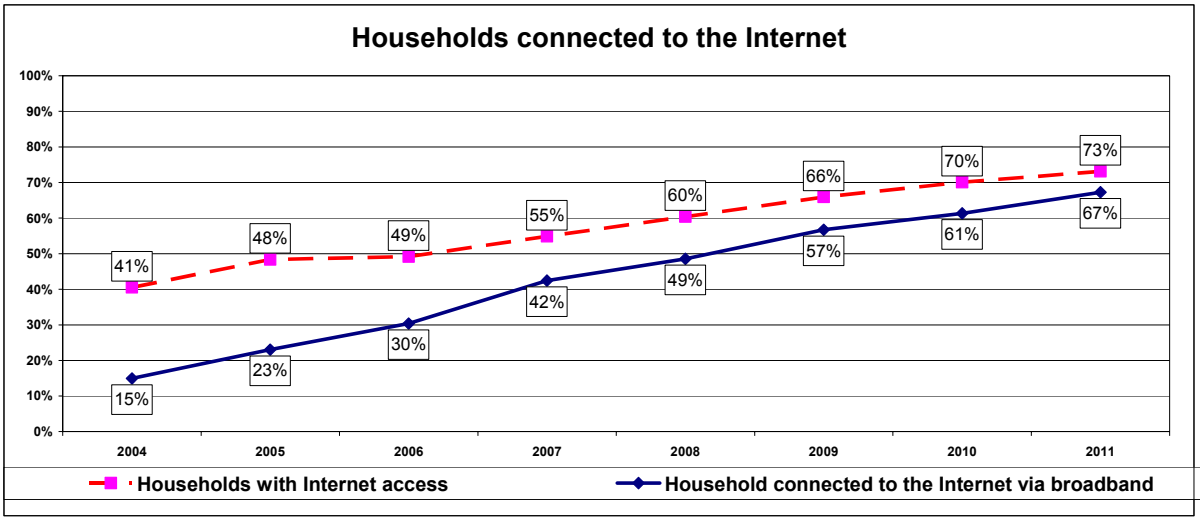
Source: Eurostat Community Survey on ICT Usage by Households and by Individuals

The above slowdown also matches the deceleration in the number of new broadband lines and of households connected to the internet. Seventy-three percent of all EU households are

[3] Regular internet users are defined as those that use the internet at least once a week.
[4] http://ec.europa.eu/information_society/digital-agenda/scoreboard/docs/scoreboard.pdf

connected to the internet, 3 percentage points up from 2010 (Figure 7). Already 67% of all EU households connect to the internet via broadband.

Figure 7



Source: Eurostat

With regard to the regular use of the internet by disadvantaged people[5], data for 2011 show that the rate has increased to 51% from 48% in 2010. There has, nonetheless, been a slowdown in progress, meaning that the target will be achieved later than announced in the DAE 2010 scoreboard, although arguably still before 2015.

As for people who have never used the internet, age is a primary factor in determining the probability of using the internet regularly as well as using ICT in general. Education is another important factor (Figure 8 and 9).

5 For the measurement of the Digital Agenda target, disadvantaged people include three main groups of individuals: those over 55 years of age, the low educated (ISCED 0-2), and those that are out of the labour market (the inactive, retired and unemployed). While other socially disadvantaged groups such as the disabled, those on low incomes, people living in thinly populated areas and women are also the target of eInclusion policy, these three groups constitute those which have been shown to be most disadvantaged in terms of their access and use of the internet and taking these three groups we are able to cover a large proportion of the eExcluded, as individuals often belong to more than one disadvantaged group.

Figure 8 Regular internet users in the EU27 in 2006 – breakdown by age-education groups

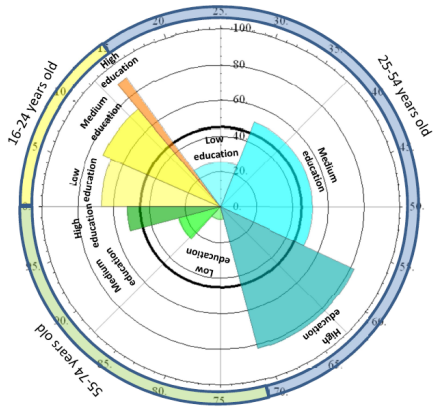
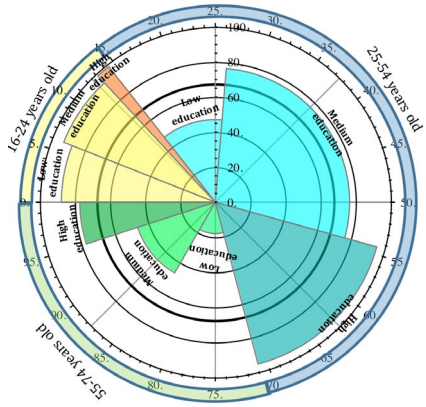


Figure 9 Regular internet users in the EU27 in 2011 – breakdown by age-education groups



Source: Commission services on the basis of Eurostat Community Survey on ICT Usage by Households and by Individuals. The amplitude of each sector represents the demographic weight of each age-education group in the total EU27 population while its height represents the percentage of regular Internet use for that group.

Among the youngest users, differences due to educational attainment have tended to disappear in the last years and in 2011 almost all people aged 16-24 with high formal education and with medium formal education were regular users (98% and 93% respectively) while 88% of the low educated in this age group were regular users.

The evidence that the internet has become an indispensable tool for studying and working is the narrowing gap between regular (i.e. once a week) and daily internet access, which is only 5 and 8 percentage points for the most educated people in the 16-24 and 25 to 54 age cohorts, down from around 15 percentage points in 2008 and 22 in 2004. However schools or universities are not the main location from which the internet is used, since just around 40% of young people declare that they have used the internet at that place; rather between 95% and 90% of young people access the internet primarily from home depending on their educational level.

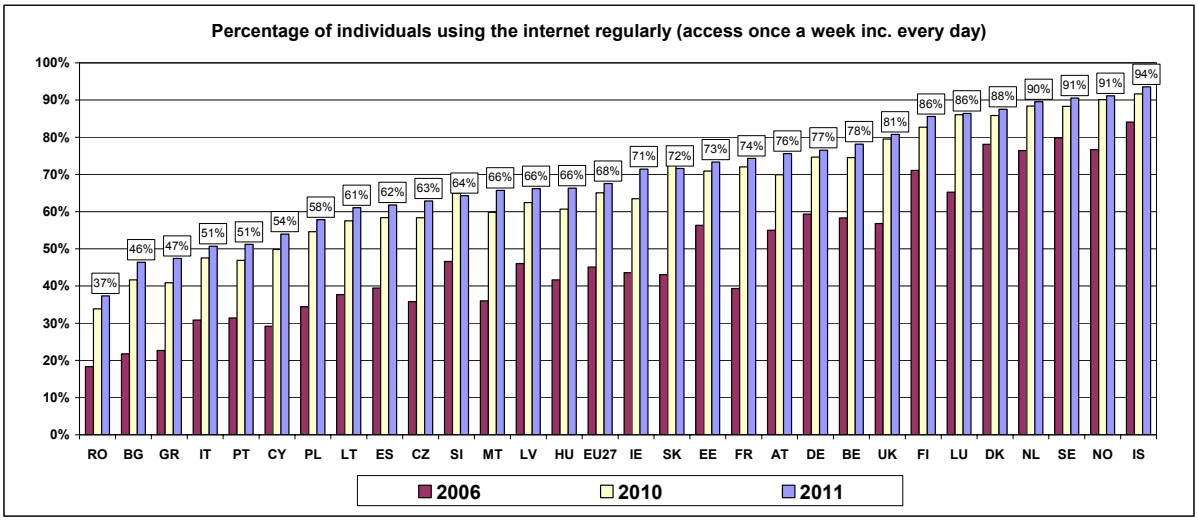
Among 25-54 year olds, education continues to make a great difference with almost all highly educated people (96%) being regular users compared to 76% for medium education and 47% for low education. However, the latter group has registered the highest growth in 2011 with a 4 percentage point increase in one year.

As indicated above, older people (55-74 years old) are the segment with the lowest adoption rates and this is also reflected in the average frequency of regular use, with just 49% of individuals aged 55 to 64 being frequent users, a figure that falls drastically to 28% for the people aged between 65 and 74. The impact of educational attainment is much more visible in this age group as 77% of older people with higher levels of education are regular users compared to just 18% of the less educated ones. Progress over the last year has been similar in the three categories, regardless of the educational level.

Data on internet access and use by third-country nationals (people born in a country outside the EU), albeit from a limited number of countries, show that the rate of internet use if very similar across the two groups. For example, in 2011 68% of migrants in the countries reported used internet in the last 3 months, compared to 70% of the native born. Rate of frequency of use are also fairly similar, as well as skills levels. The main difference relates to the place where the internet is accessed. Native born use more the home and the place of work than migrants, who use more other places to have access to the internet, for example public internet access points.

Looking at regular internet use by country, very significant differences still persist. Two non-EU countries, Iceland and Norway, have the highest rankings in Europe, followed by Sweden and Denmark. The gap within EU countries is still very high (54 percentage points, albeit down from 62 points in 2006) despite the impressive increase in regular use by many of the less developed economies since 2006. Over the last year, Ireland was the country that experienced the fastest growth (8 points), followed by Greece, Malta, Austria and Hungary. The gap will get smaller in the future as in the most developed countries there are not many possibilities for further growth (Figure 10). More worrying is the apparent regression in Slovenia and Slovakia and the slowdown in the UK.

Figure 10



Source: Eurostat

1.2.1. Place of internet access and access by device and age of internet users

Age also has an impact on the places and the devices used for accessing the internet. Access from home is the most typical way, regardless of age, for all users (93%) in the last three months. As can be expected, most elderly internet users aged 65 to 74 (79%) access the internet from home only; a situation shared by 53% of users aged 55 to 64. The figure declines for younger people (32% of those aged 25 to 34 and 24% for the youngsters aged 16 to 24).

However, differences are more visible when it comes to accessing the internet from other places in addition to the home: obviously the place of work and education would appear to be the natural secondary places for accessing the internet. Around half of users of working age also access the internet at their place of work. The number of students accessing the internet in a place of education is slightly lower than this. Interestingly, around one quarter of the people who used the internet in the last three months also accessed it from another person's home. This figure has been stable over the last years.

In addition to these two places, the internet can be accessed anywhere away from home via a mobile and/or wireless connection, typically though a wifi hotspot[6]. Seventy-seven percent of European households are equipped with a personal computer, either desktops or laptops, with the latter representing around 70% of the PC market[7]. This, along with the rapid spread of mobile handsets and especially smartphones over the last two years, has resulted in 43% of internet users accessing the internet wirelessly away from home or work. With larger and better resolution screens, smartphones have become a sort of multifunctional device, used both for working and entertainment while still being used for making voice calls, although the

[6] Notwithstanding the fact that a large share of mobile phone usage takes place in the home. In 2011 there were around 125 million connected devices in Western Europe and this number is expected to increase to around 285 million by 2015, of which only 25% will be PCs (Source: IHS ScreenDigest). In an effort to alleviate data traffic overload from its mobile networks, operators have started implementing traffic offload strategies, primarily through WiFi and femtocells at home.

[7] EITO 2011.

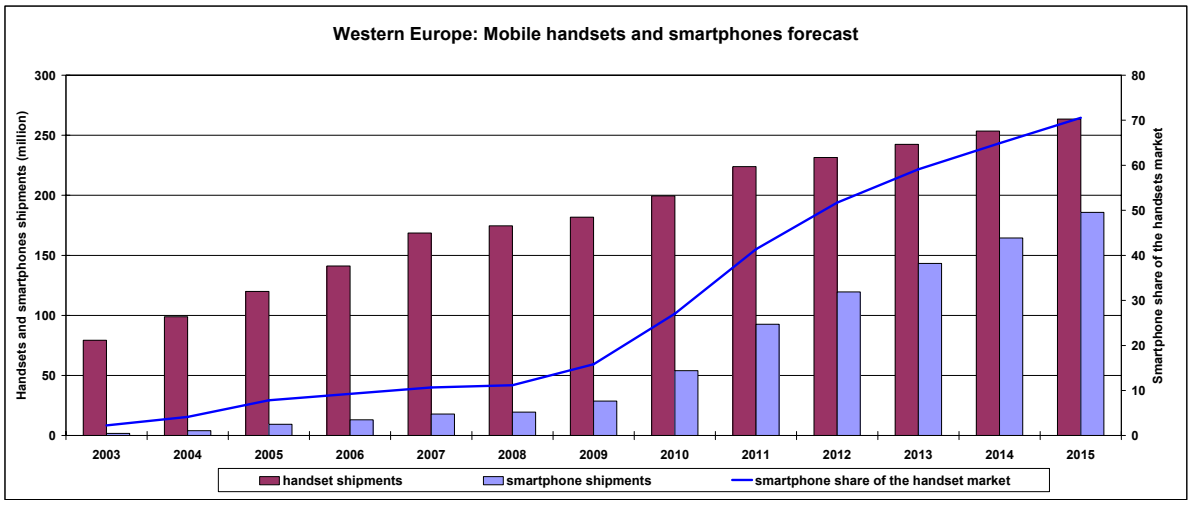
latter seems to depend on the level of development of the mobile market[8]. Between 35 and 40% of users aged 16 to 34 access the internet using these devices away from home or work. The use of mobile phones for accessing the internet is not that widespread for older people and clearly not for the elderly. Only 18% of internet users in the last three months aged 45-54 connect to the Internet from mobile devices and only 11% of users aged between 55 and 74 do so (Figure 12).

Despite the rapid rise of smartphones, mobile connectivity through portable computers (mainly laptops and tablets more recently) is still popular and on many occasions both types of equipment are used. Portable computers still seem to be preferred over smartphones by the more mature population of working age (35 to 54).

Since the appearance of tablets in the market two years ago, the boundaries between smartphones and portable computers are blurring and it is very likely that the future will be marked by a coexistence of handsets, tablets and devices halfway between these two. It is estimated that at global level, media tablets sales to end users totalled 63.6 million units in 2011, a 261.4% increase from 2010 sales of 17.6 million units, and sales are forecast to reach between 285 million and 326.3 million units by 2015[9].

With regard to mobile phones and smartphones, analysts estimate (Figure 11) that smartphones represented 41% of the handset market in 2011 in Western Europe, up from 11% in 2007, and that by 2015 the smartphone share of the handset market will rise to 71%[10].

Figure 11



Source: ScreenDigest

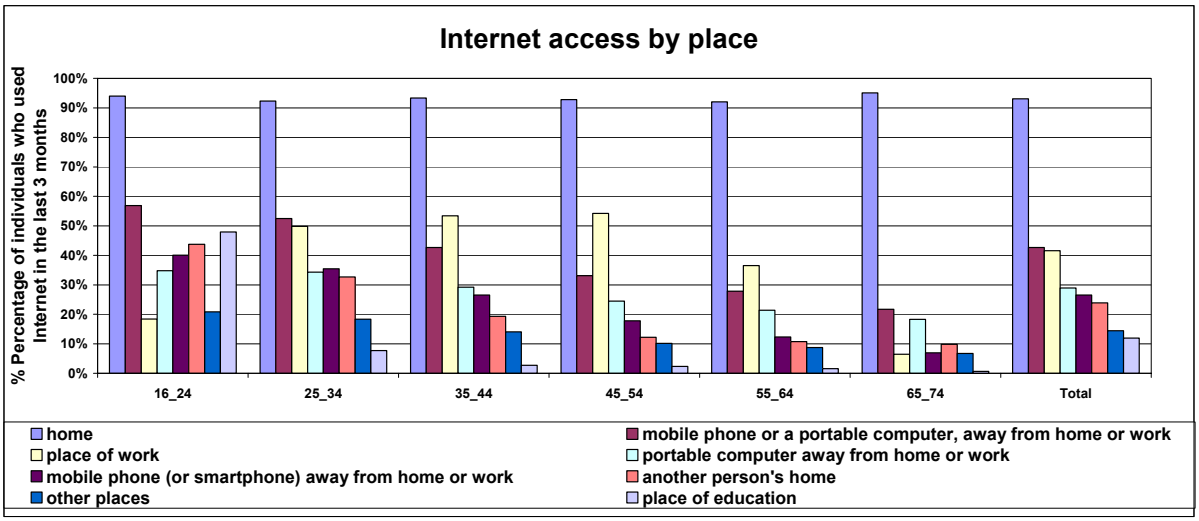
[8] A recent survey in South Korea showed that 42.4 percent of smartphone and tablet PC users aged between 12-59 cited the Internet and mobile apps as their main purpose of smartphone use, while voice calling and text messaging make up 39.3 percent and 18.3 percent, respectively.

[9] Gartner's *"Gartner Reveals Top Predictions for IT Organizations and Users for 2012 and Beyond"*, HIS iSuppli's *"Apple set to regain media tablet market share with release of new iPad model"*

[10] For instance at the end of 2011, 250m Android devices had been activated and there had been 11 billion application downloads cumulatively from the Android Market. Currently there are around 700,000 Android device activations a day.

Finally, other places are used as well to access the internet, and again the main determinant is age, since the lower the age, the higher the propensity to access from many other places (Figure 12).

Figure 12



Source: Eurostat

1.2.2. Most popular services.

Finding information about goods and services was by far the most popular service of those activities included in the 2011 survey, with 79% of people who used the internet in the last 3 months (Figure 20). Use of the internet for finding information grew between 2004 (73% of users) and 2007 when it reached a plateau (81% of users). Since then the rate has stabilized at around 80% of users. Data confirm that search engines are a function used by many users; the main entry gate in many cases with 71% of people[11] having used a search engine to find information at any time in the past, up from 51% in 2005.

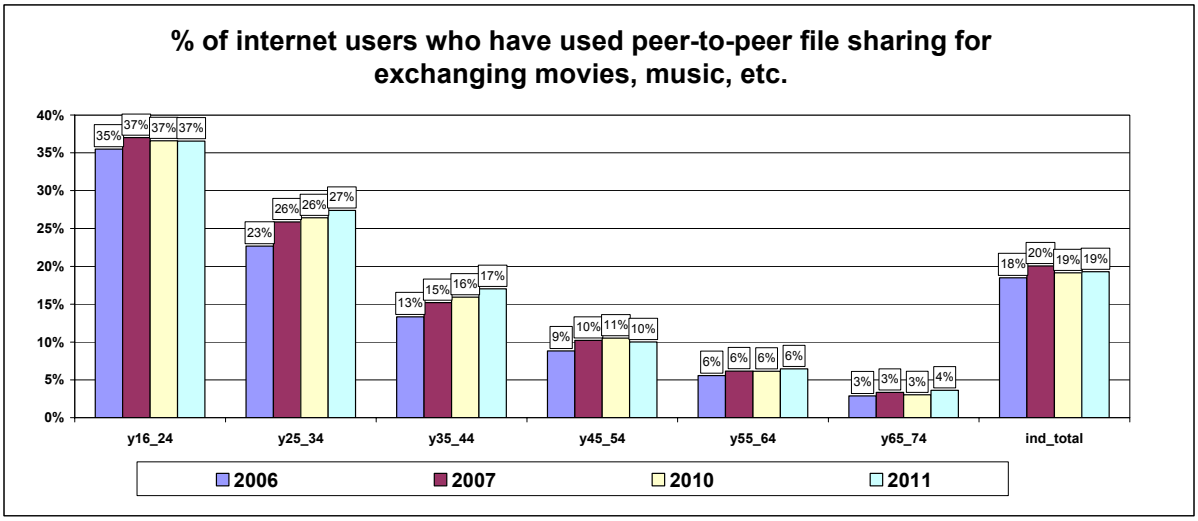
The internet continues to be an important source of news and general information. Reading and downloading online newspapers and news is the second most popular service (56% of users) with many users subscribing to news services and products such as RSS. This is closely followed by the search for information on health, general knowledge (i.e. consulting wikis such as Wikipedia) and travel and accommodation (54% of users in all three cases).

While the aforementioned services are rather passive and unidirectional, participation in social networks has risen over the last years to similar levels of take-up, with 53% of internet users having a profile and posting messages and content to social networks such as Facebook or Twitter. By contrast, professional networks do not yet seem to appeal to many users as only 10% are active in these kind of networks. Social networking is used as much as internet banking (52% of internet users) and e-commerce. Within this latter category the internet is mostly used as a purchasing channel as only 23% of users sold goods or services through it (cfr. section on e-commerce below).

[11] Percentage of individuals that have used the internet, ever

Peer-to-peer (P2P) file sharing for exchanging movies and music is used by 19%[12] of internet users and this figure has been stable over the last four years despite the reduction in the proportion for the youngest users, aged 16 to 24. One in every three users at this age exchange multimedia files through peering techniques (Figure 13). This stable rate of P2P users is explained by the sustained increase in the use of P2P by older people: 27% of users aged 25 to 34 now exchange files through P2P, up from 19% in 2005, and up to 17% of people between 35 and 44 years old.

Figure 13



Source: Eurostat

Much caution should be applied regarding the figures on the use of P2P as this practice is associated by many with illegal content. Indeed, according to the music industry[13], 28% of internet users globally access "unauthorised" services on a monthly basis and around half of these are using P2P networks. According to this same source, in the US in 2010 only 35 per cent of P2P users paid for music downloads but an amount that on average was a third of the amount paid by those who subscribe to a music service.

Uploading content (images, films or music) or gaming is another typical use of the internet by younger people, although here there also seems to be a spread of this use to other ages. Almost two thirds (56%) of 16-24 year old people have engaged in this activity.

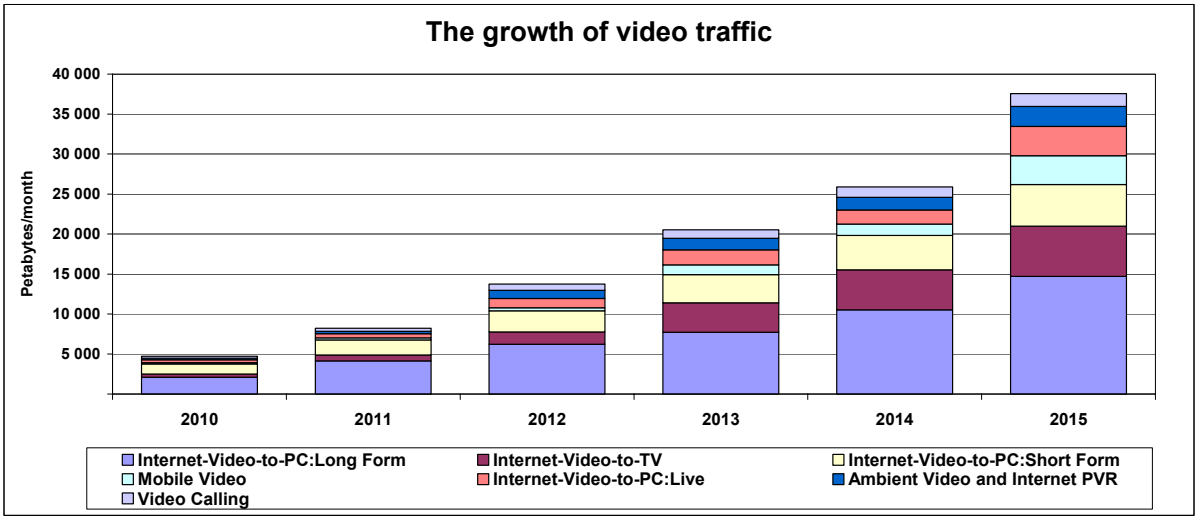
Interaction with public administration is also a very popular way of using the internet, although for the first time in four years there has been a stall in the number of e-Gov users: 41% interacted in the last 12 months, the same figure as in the previous year, and 35% obtained information from public authorities web sites, two points below the 2010 figure.

Data also show that the internet is transforming the way in which people communicate. The rapid rise of social networking, together with texting, has meant that traditional communication services such as voice telephony are shrinking, with 71% of households having a traditional fixed telephone access, down from 73% in 2009[14]. Meanwhile, internet telephony and video calls continue to grow at a slightly faster pace than in 2010. Availability

[12] Users that have ever carried out such activity
[13] IFPI's Digital Music Report 2012
[14] *E-Communications Household survey 2011*

of faster broadband access will arguably boost this type of service and high quality teleconference is often cited as one of the services that, together with the "connected TV" (cfr. infra), will boost the number of users communicating in this way. Video calling is predicted to take almost 5% of internet video traffic in 2015[15] (Figure 14).

Figure 14



Source: EC services based on CISCO

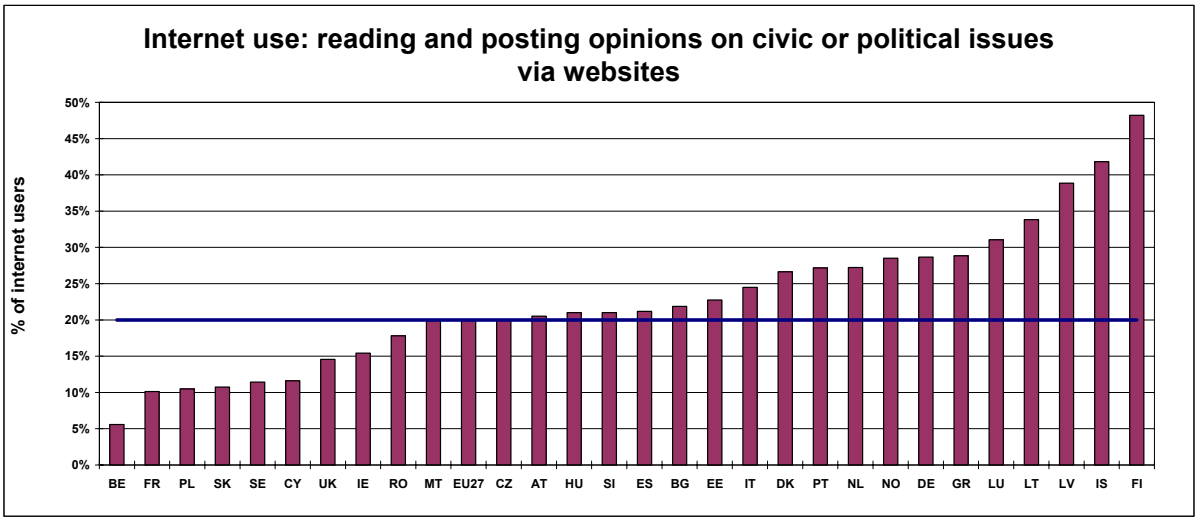
Besides classic e-mails (89% of users in 2010), internet users are increasingly adopting social networks as a means to communicate with their friends and family. Much has been said about the use of social networks as a major driver of news, but recent research in the US[16] has shown that this is not the case as only 9% of adults get news very often through social networks and the large majority of them still go to news websites, use keyword search or get news through a news organising web site or application.

Where the internet seems to be not yet fully exploited by citizens is as a tool for civil and political participation. Ironically, in the year of the 'indignados', the 'social power' driven by 'leaderless movements' and the Arab spring, only 20% of users declare that they have read and posted opinions on civic or political issues via websites (e.g. blogs and social networks) and only 10% took part in online consultations or voted to define civic or political issues (e.g. urban planning or signing a petition). This contrasts significantly with the spread of social networks. But this 10% figure could also be seen as a very positive development if one considers that recent research has demonstrated that still many decision makers doubt the representativeness, surplus value and quality of the input of the new channels and that only a few decision makers are prepared to accept the direct inroads of e-participation on their decisions[17]. That 10% of users have engaged in this type of service means that in some Member States, public authorities have started using online channels in their policy decision making process.

[15] Cisco, *Visual Networking Index, 2011*
[16] *2012 State of the News Media Report*, Pew Research Center Project for Excellence in Journalism,.
[17] *Universität Siegen, Fachbereich Wirtschaftsinformatik und Neue Medien, et al. "Study on the Social Impact of ICT"*, available at http://ec.europa.eu/information_society/eeurope/i2010/docs/eda/social_impact_of_ict.pdf

Despite the high adoption of social networks and the perception by many users that these networks are a good way for political expression and participation due to their open nature and intrinsic transparency, it seems that many Europeans still have concerns about them as a tool for political participation. Obviously consumers are becoming more and more aware of the double-sided nature of these sites, i.e. anyone can use them as a channel to convey their messages but anyone can use it as a tool to know what others think and say. Privacy therefore came as a hot topic on the agenda of many service providers, consumer associations and national governments in 2011. In several countries around the world, national authorities decided to shut down social networks in 2011 to avoid protests and similar actions were discussed within the EU as well[18].

Figure 15



Source: Eurostat

There is not any clear pattern among the countries where the internet is used for political or civic participation (Figure 15). Finland seems to have the highest number of cyber activists relative to its internet users (almost half of these), followed by Iceland, Latvia and Lithuania. But the proportion of users active in political cyber discussions is similar in countries such as Germany, Greece, the Netherlands or Portugal, and very low levels of activism are found in Belgium, France and Poland.

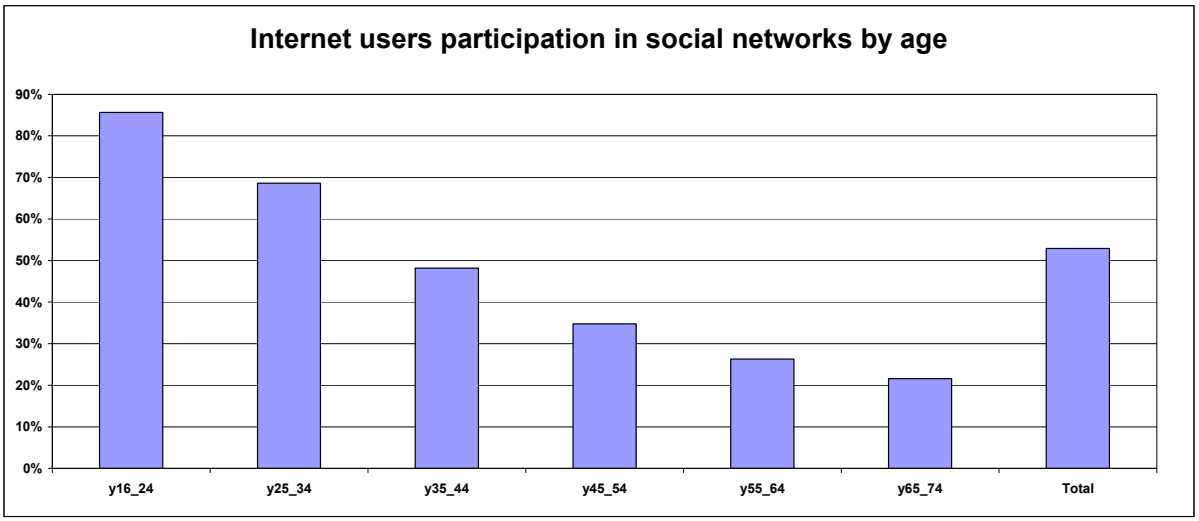
1.2.3. The use of social networks in Europe

Social networks are predominantly used by young people and as many as 86% of internet users aged 16 to 24 and 69% of 25 to 34 year-olds participate in social networks (Figure 16). Although use is less widespread as age increases, already almost half of regular users aged 35-44 (48%) and 35% of 45-54 year-olds have participated in social networks in the last three months, demonstrating the increasing popularity of social networking. In connection to this, content uploading is also a typical use of the younger cohorts, although differences according

[18] For some experts, the shutdown in Egypt in January 2011 was unprecedented in the history of the web. During the riots in London in August 2011, public authorities noted that rioters had used social media and networking services to organise their gatherings and there was a debate about the possibility of ordering the network to be closed down. Police acknowledged having intercepted messages on BlackBerry Messenger after confiscating phones from arrested troublemakers.

to age tend to be lower for this second usage. Users, especially young people, upload to social networking sites significant amount of personal information and contents, including their photos (57%), activities (43%) and preferences (36%)[19].

Figure 16



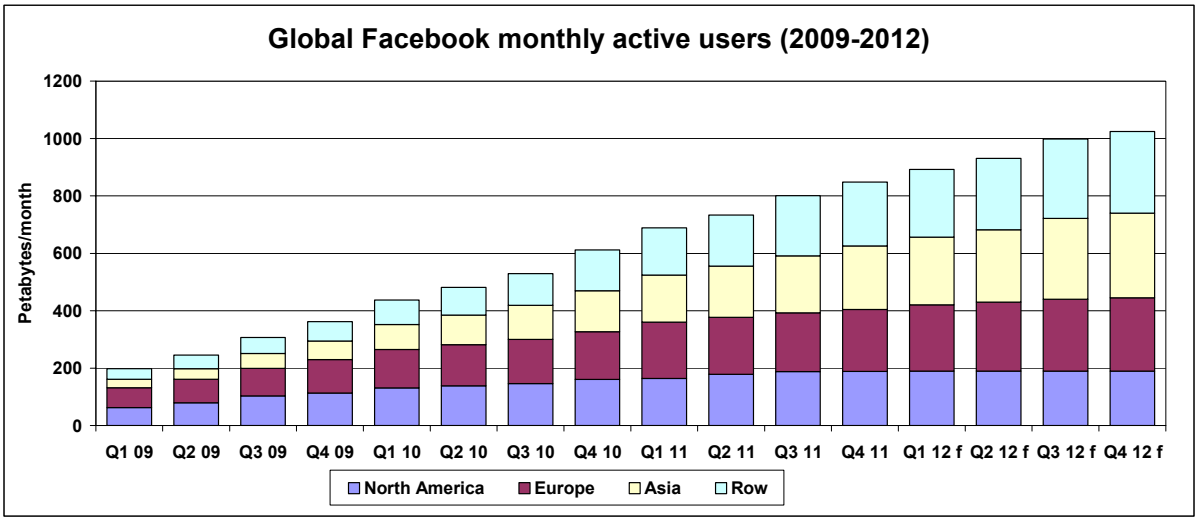
Source: Eurostat

Social networking has rapidly become the primary online activity, accounting for 1 in every five online minutes[20]. According to the same source, there will be around 1.2 billion users of social networks around the world at the end of 2011. Facebook appears to be the most popular network in the world, with 843 million monthly active users at the end of Q4, and it certainly is the most popular network in Europe with its 229 million active users as of December 2011, equivalent to almost half the entire EU population, Europe is Facebook's largest market worldwide (Figure 17). Other large local networks are preferred in other countries, for instance Renren and Weibo in China, VKontakte in Russia and Orkut in Brazil.

[19] JRC Scientific and Policy Report EUR 25295 EN 'Pan-European Survey of Practices, Attitudes and Policy Preferences as regards Personal Identity Data Management' (May 2012).

[20] comScore's Report: "It's a Social World: Top 10 Need-to-Knows About Social Networking and Where It's Headed", http://www.comscore.com/Press_Events/Press_Releases/2011/12/Social_Networking_Leads_as_Top_Online_Activity_Globally

Figure 17



Source: IHS ScreenDigest

In addition to Facebook and other major global networks such as Twitter (300 million users) and the professional network Linkedin (120 million), there are many other very popular social networks with strong take up in the EU countries, be it based on national characteristics or on particular interests (general purpose, chat rooms, dating, universities, photo sharing, music, books, travels, etc.).

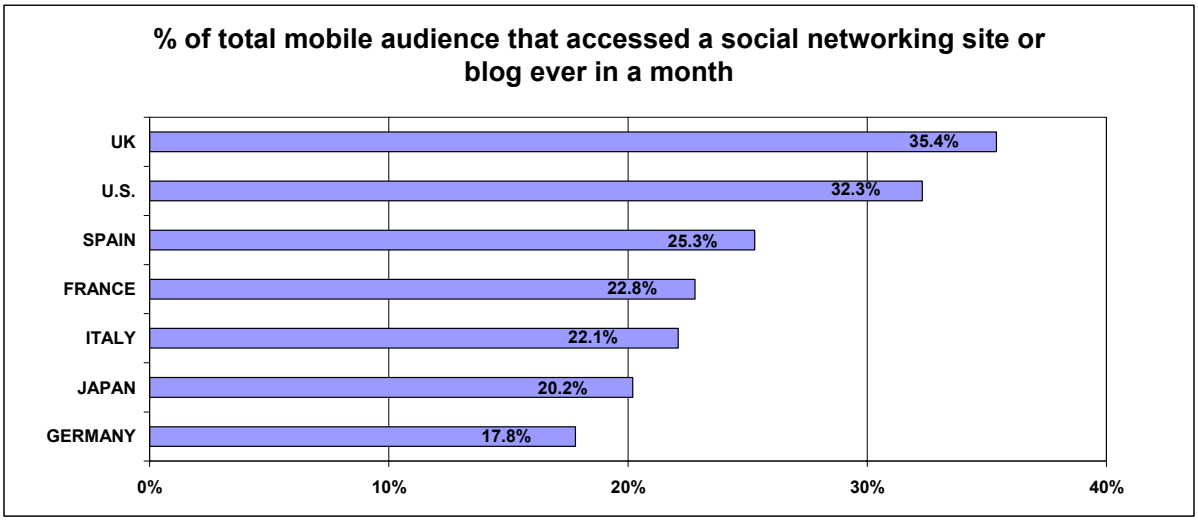
Data also show that the trend is towards a more regular use of social networks since the share of daily use over monthly use is rapidly increasing (almost 65% at the end of 2011 from 50% in three years[21]).

Access to social networks is more and more taking place from mobile networks[22] (Figure 18); users check their friends' feeds, upload photos and disclose their location. Indeed some telecom operators in 2011 claimed that their wireless consumer operations were hit by consumers dropping traditional mobile phone and text messaging services in favour of connecting via social networks. The most popular uses of social networks, in addition to comment posting and sharing, include location-based services, coupons, news feeds and live events. This trend has prompted many mobile handset manufacturers to integrate social network applications into their operating systems.

[21] Source: IHS Screen Digest

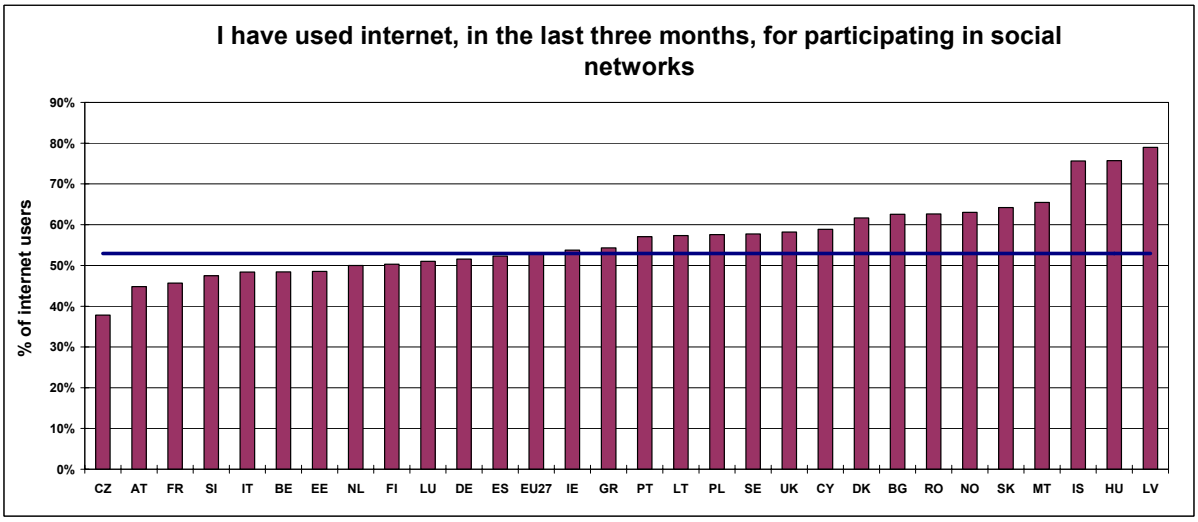
[22] comScore's Report: "It's a Social World: Top 10 Need-to-Knows About Social Networking and Where It's Headed: …"Across five leading European markets (France, Germany, Italy, Spain, United Kingdom), nearly a quarter (24 percent) of the total mobile population reported engaging with their social networks on their mobile devices." According to Twitter chief executive Dick Costolo, "40% of all tweets are banged out on mobile devices".

Figure 18



Source: IHS ScreenDigest

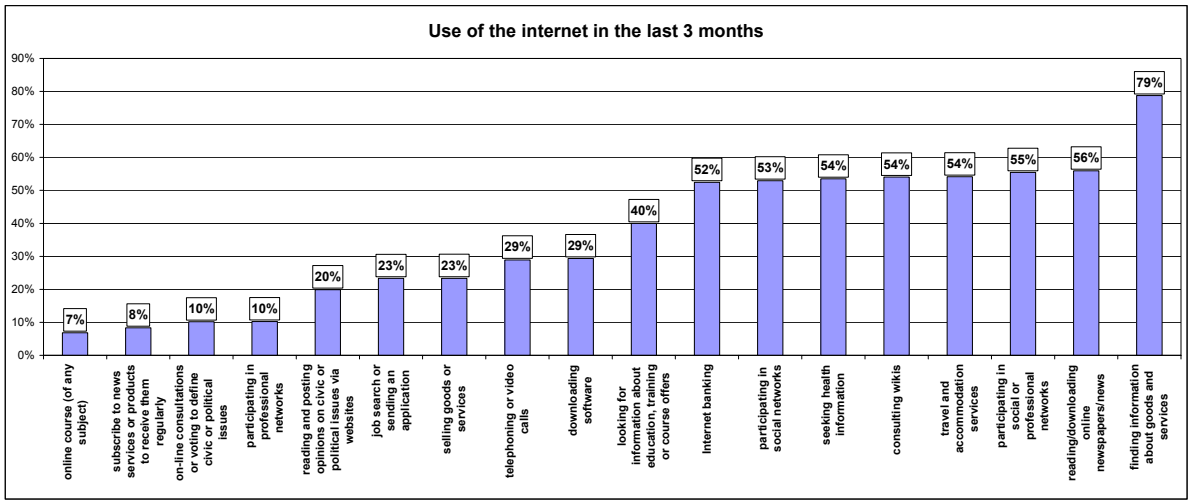
Figure 19



Source: Eurostat

Social networks are also becoming an important sales channel for many companies, as they can address their messages to an interested audience based on a deeper knowledge of the personal interests of each user. Also, many public authorities and interest groups are using social networks to communicate with their constituencies and stakeholders.

Figure 20



Source: Eurostat

1.3. The use of e-commerce by individuals

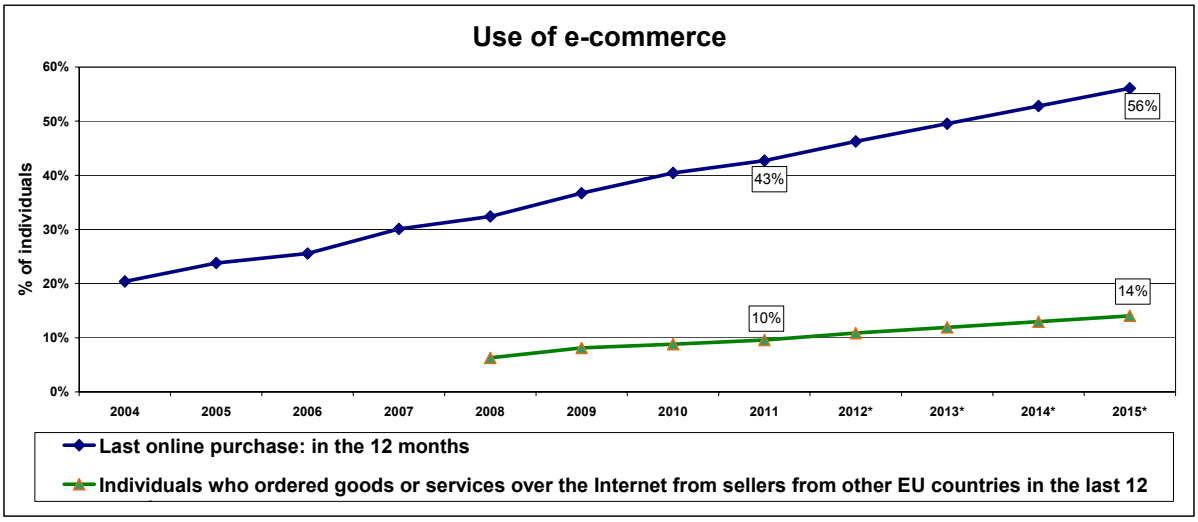
Targets:

Promoting e-commerce: 50% of the population should be buying online by 2015.
Cross-border e-commerce: 20% of the population should buy cross border online by 2015

As with the regular use of the internet, use of e-commerce also progressed in 2011 at a slightly lower pace than in previous years. E-commerce in the last twelve months was used by 43% of the EU population aged 16 to 74 years, 2.3 percentage points above 2010, and just 34% of Europeans used e-commerce in the three months before being surveyed. With regard to cross border e-commerce within the European Union, progress was similar to 2010, which means that the increase was very low - less than one percentage point - and only 10% of the total EU population ordered goods or services from sellers from other EU countries.

At this pace, a pure linear projection based on progress since 2004 shows that by 2015 it can be expected that 56% of the EU population will have made an online purchase in the last 12 months, six percentage points above the EDA target. With regard to cross-border e-commerce, the second target will not be met as only 14% of people will have carried out this activity.

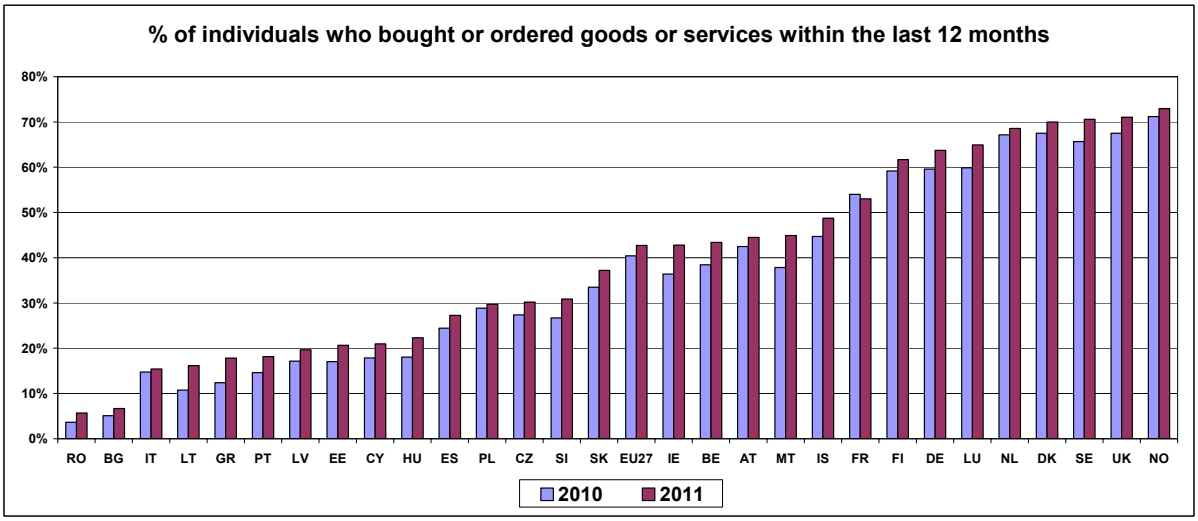
Figure 21



Source: Eurostat

All EU countries except for France (2010: 54%, 2011: 53%) showed positive developments, although with very uneven distribution (Figure 22). The number of e-buyers surged in Malta by 7 percentage points, Ireland (6) and Belgium (5) placing these three countries above the EU average (3 p.p.). Luxembourg and Sweden also increased their rates by five points. Greece and Lithuania each managed to grow 5 points, although they are still laggards because all other countries above them already had many more e-commerce users in 2010 and in 2011 experienced growth rates of between two and four points. A similar situation occurs in Hungary, a country that despite a healthy increase of 4 points does not change its ranking. Romania and Bulgaria, at the lower end of the ranking with just 6% and 7% of the population buying online, did not progress much, a situation that also occurred in Italy, bringing this country to the third lowest place with 15% of the population.

Figure 22



Source: Eurostat

The number of users engaging in cross-border online commerce increased in all countries except Denmark, France (with a slight decrease), and the UK and Poland, where there was no

variation (Figure 23). It is worrying that the more developed countries in cross border e-commerce are progressing much faster than the less developed ones, creating an ever wider gap: Luxembourg, Malta and Austria saw growth rates of three percentage points; these leaders were closely followed by a group of four countries that had the largest increases in 2011 (Finland had the largest increase with over 6 percentage points, followed by Belgium, Ireland and Sweden with around four points). Conversely, the countries with the lowest number of cross-border online buyers (Romania, Poland and Bulgaria) experienced very slow progress. The gap in cross-border online commerce has therefore increased from 52 to 55 percentage points. It is also significant that in many countries where this indicator is below the EU average, progress was very slow with countries such as Italy, Portugal, Latvia or Germany displaying growth rates close to or below one percentage point.

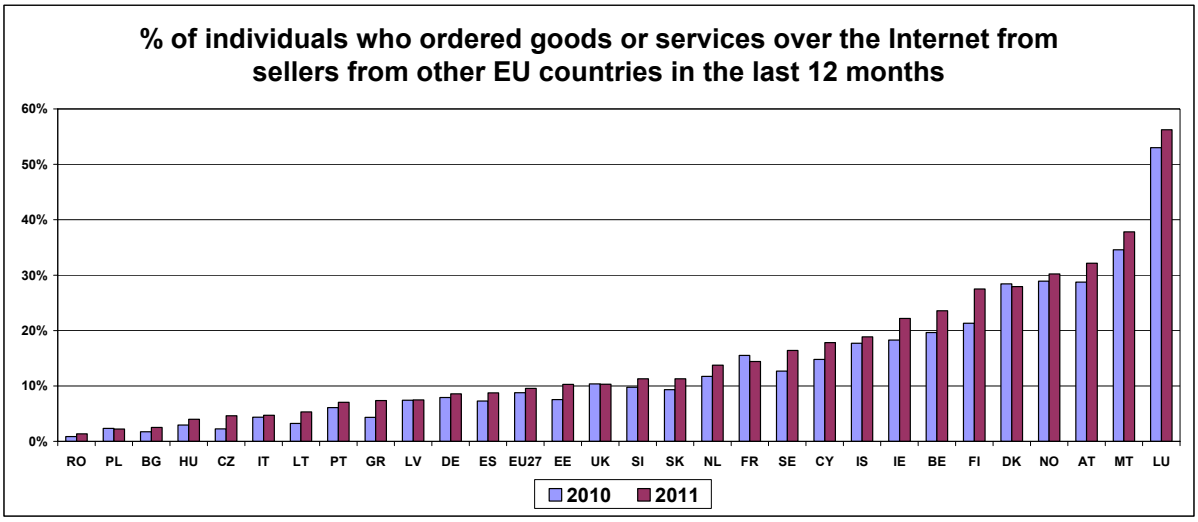
The European Commission has launched a study[23] to estimate the value of online cross-border trade in the EU and quantify the importance of drivers and barriers in online cross-border trade.

The low use of cross-border e-commerce by individuals is matched by the limited number of enterprises selling electronically. In 2010, while almost all enterprises making electronic sales (15%) reported that they sold to markets in their own countries (14%), only 6% of enterprises made e-sales to other EU countries (Figure 24: E-commerce sales to own country and other EU countries, 2010 (% of enterprises)). In particular, the potential for cross-border e-commerce sales to other EU countries was not fully exploited. While 28% of enterprises in Denmark made e-sales — ranking it first among the EU countries — only 8% of enterprises reported selling to customers in other EU countries. A similar phenomenon can be observed in Sweden where 26% of enterprises made e-sales but only 9% sold to other EU countries.

Concerning e-purchases, while almost all enterprises making electronic purchases (35%) reported purchasing from their domestic markets (32%), only 10% of enterprises made e-purchases from other EU countries. The biggest differences can be observed in Norway and Germany. In Norway, 61% of enterprises made e-purchases, while 15% purchased electronically from suppliers in an EU country. Similarly, in Germany 5 out of 10 enterprises made e-purchases, while only 1 in 10 made e-purchases from another EU country. Across all countries, the highest percentage of e-purchases from other EU countries was reported in Austria.

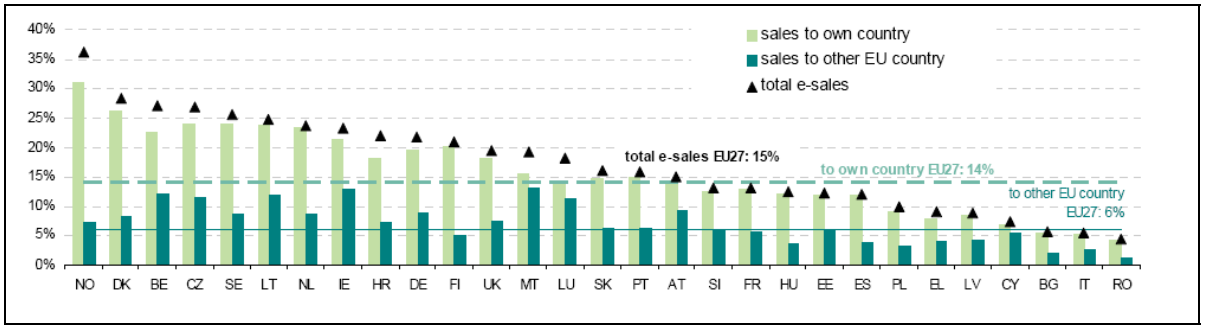
[23] Drivers and impediments for online cross-border trade in the EU, Study by DG INFSO and IPTS. According to another study by eBay (Enabling Traders to Enter and Grow on the Global Stage), "*tying countries closer together in a trade union, such as the EU with its (political, social and economic) internal market, has significant effects on trade between those countries: membership of the EU increases crossborder eBay trade by 40.5%*". http://www.ebaymainstreet.com/sites/default/files/eBay_Enabling-Traders-to-Enter-and-Grow-on-the-Global-Stage.pdf.

Figure 23



Source: Eurostat

Figure 24: E-commerce sales to own country and other EU countries, 2010 (% of enterprises)

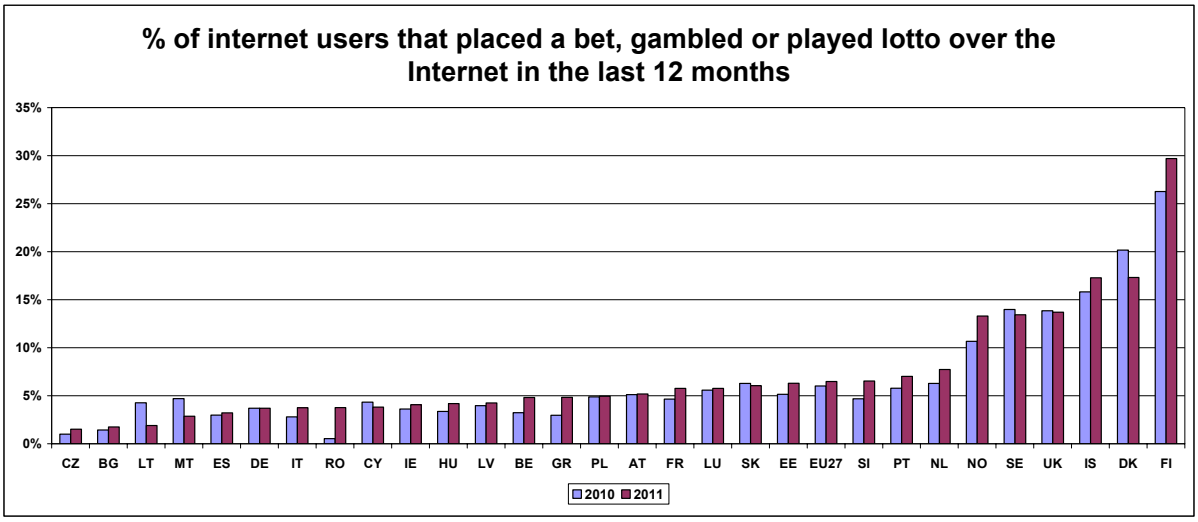


Source: Eurostat

Online gamblers

An interesting indicator on e-commerce refers to the number of online gamblers and lotto players (Figure 25). Annual revenues were estimated to exceed EUR 6 billion in 2008 and are expected to double by 2013. Betting platforms such as Betfair manage more daily electronic transactions than the New York stock exchange. There is no clear correlation between the number of users of e-commerce and the number of online gamblers. Finns are well ahead other countries, with as many as 30% of internet users in the past 12 months gambling or playing lotto online. This use seems also very popular within the Nordic countries and the UK, with usage rates around 15%. All the other countries have similar, much lower rates, between four and six percent of internet users, with only the Netherlands, Portugal and Slovenia going beyond the 6% EU average.

Figure 25



Source: Eurostat

1.3.1. Connectivity and online entertainment

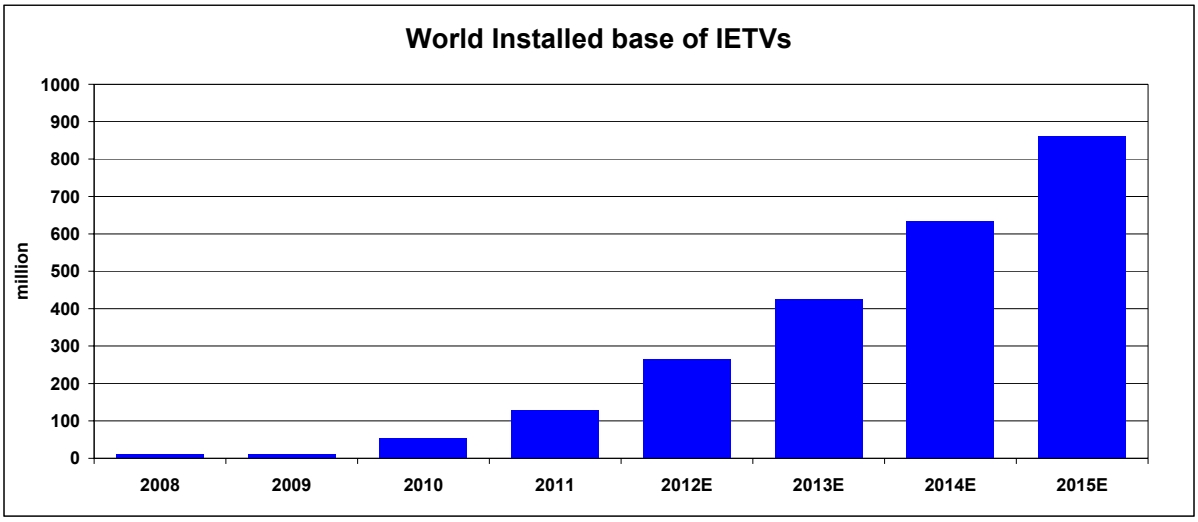
After information on goods and services has been searched on the internet, half of the people who ordered goods or services over the Internet for private use in the last twelve months did it to acquire three major types of items: entertainment and educational material (films/music or books/magazines/e-learning material or computer software) (57% of online buyers) (Figure 27), travel and holiday accommodation, and clothes and sport goods (52%). Household goods and tickets for events are another popular e-commerce purchase (38% and 37% of online buyers, respectively). Food and groceries, medicines and financial/insurance services are acquired through the internet by a much lower number of citizens, between 15 and 10% of online buyers.

Obviously, digital goods and services that can be delivered on-line, i.e. streamed or downloaded, have a natural advantage and there are signals that in the future online delivery will have a more significant role in the distribution of these types of goods[24]. The massive advent of the smart or connected TV will arguably accelerate this trend; it is estimated that more than 13 million smart or hybrid TVs will be sold in 2012, making up 24% of total TV shipments in 2012 in the EU25, up from 4% in 2009 and 11% in 2010[25]. At world level, the number of connected TVs will also explode, with more than 250 million units in 2012 and 860 million units in 2015 (Figure 26).

[24] Netflix, a US provider of online streaming service, was founded as a mail order DVD rental business in 1998. In 2007 it launched its online service, which has now become the main consumption channel. DVD-only rental subscriptions fall from 6.3 million immediately before the launch of online streaming in 2007 to 2.3 million by the end of Q3 2011. (Source: Enders). In 2012 it is expected that US consumers will buy 3.4bn movies online, which represents 1.04bn more movies per year than are consumed on DVD and Blu-ray combined and a year-on-year growth in online consumption of 135 per cent (Source: HIS Screen Digest).

[25] EITO 2011

Figure 26



Source: IHS ScreenDigest

The increasing number of internet connected devices per households is expected to have an obvious positive impact on the music, movies, software and games markets (cfr. infra on games).

Despite these expected developments, 2011 saw a general decline of 3 percentage points in the number of individuals buying software, magazines, music or films online from a peak in 2010 (Figure 27). The decline affects all categories of services, being stronger in purchasers of computer software and games, less marked in films and music and almost stable in e-learning material.

Eurostat data do not indicate whether content is downloaded or streamed but market data show a clear trend towards online streaming of music and films in parallel to a lower year-on-year growth in the number of downloads of this type of content. More and more consumers use and/or subscribe to online services that do not require the physical saving of files in computers or storage devices at home; content is rather streamed on demand from commercial sites or stored in the cloud and accessed from any connected device.

A detailed analysis of the figures show that books, magazines and e-learning material are the most demanded goods with 38% of individuals who ordered goods or services over the Internet in the last year (Figure 34). Films and music are the second most demanded service/good (Figure 28), as music and movies can either be downloaded or streamed and many services offer different subscription models that often combine the two options. Computer software (excluding games), with one in four e-commerce users, was the next category. Fewer e-commerce users (15%) purchase video games software (Figure 37).

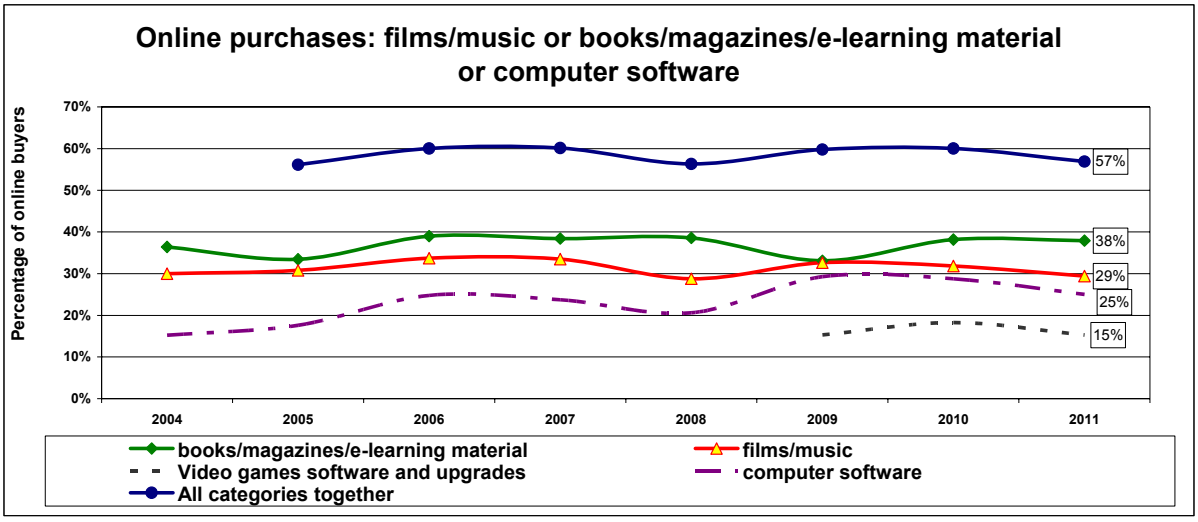
Paradoxically, the question arises as to whether enhanced connectivity automatically brings more online buyers and more online commercial transactions of these types of goods and services or whether it is driving rather a further exchange outside commercial online channels and also offline. One typical example is that of teenagers exchanging music files between their mobile handsets using bluetooth communication. As indicated above, use of peer-to-peer techniques is increasing in all age cohorts. Indeed, in the case of online purchase of music and

movies, (cfr. infra), in 17 Member States there was a decrease in the number of people buying these products online and a similar situation occurred in 14 countries with computer software.

Market data offer a mixed view as, on the one hand, it is expected that there will be an increase in the number of transactions, both in music and movies, in the short term through physical distribution and downloads and, ultimately, in the volume of files streamed from the cloud. It should also be considered that many online music and movie platforms are not yet available in all EU Member States[26]. However, according to these same data, the number of European online music subscribers reached its peak in 2009 and it is actually declining since that year, while it is expected that the number of online movie subscribers will continue increasing.

The conclusion therefore is that enhanced connectivity is bringing up sales of music and movies, while users of online music and movies platforms are consuming more content online.

Figure 27



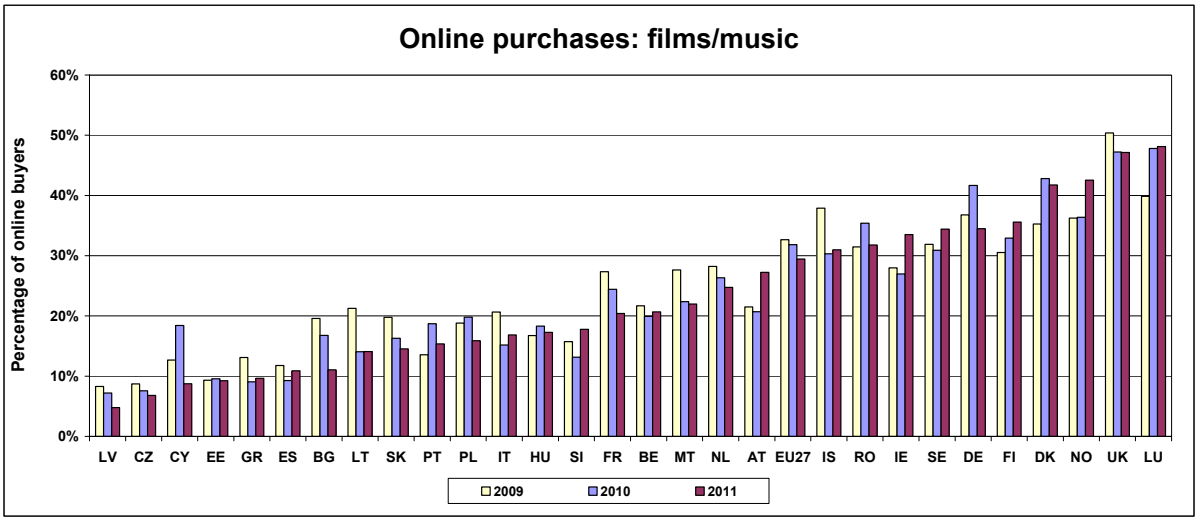
Source: Eurostat

1.3.2. The online music market

Luxembourg and the UK are the countries with the highest number of online purchasers, acquiring online music or films in the last three years (Figure 28). A second group is made up of the Nordic countries plus Germany, Ireland and Romania, all of them above the EU average. The third group of countries is characterised by a number of buyers slightly below the EU average (Austria, Netherlands, Malta, Belgium and France), while in the remaining countries the percentage of online buyers of music and movies ranges from between five to less than twenty per cent. At the EU level there was, as indicated, a slight decline from 32% to 29%.

[26] On 9 January 2012 Netflix launched its first European services in the UK and Ireland.

Figure 28

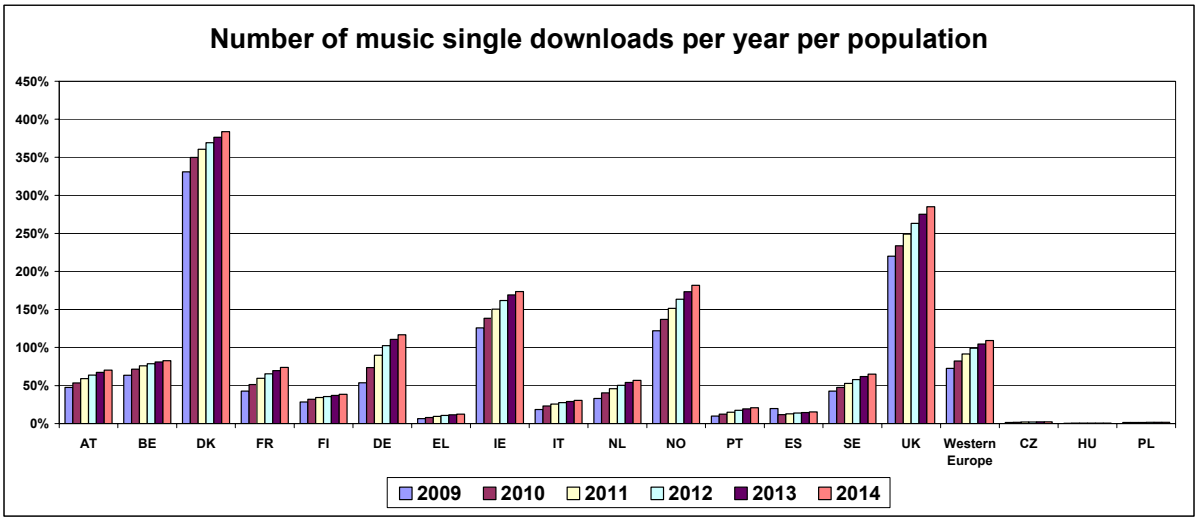


Source: Eurostat

Market data on music single (Figure 29) and album (Figure 30) downloads per population somehow correlate with the above figures and in countries such as the UK, Ireland or Norway the number of downloads is very high. Denmark is a special case as the number of single downloads represents almost four times the population of this country, while with regard to albums the country is more in line with other countries. In addition to good levels of broadband penetration, the high take up of online music purchases in these countries may be related to the availability of online music platforms, which in many cases are only available in a number of EU countries[27]. The case of Sweden is significant because the low level of downloads seems to be driven by the widespread take up of music subscription services – according to IFPI, subscription accounted for 84 per cent of digital revenues in the first ten months of 2011, boosted by Spotify. In many other countries, data point to similar levels of single downloads but in Greece, Portugal and Spain, levels do not correspond to what could be expected and in the Czech Republic, Hungary and Poland volumes are just marginal. Regardless of the level of download, the trend is similar for all countries, i.e. there was a sustained increase over the past two years and this increase is expected to continue in the next two to three years, albeit at slower rates.

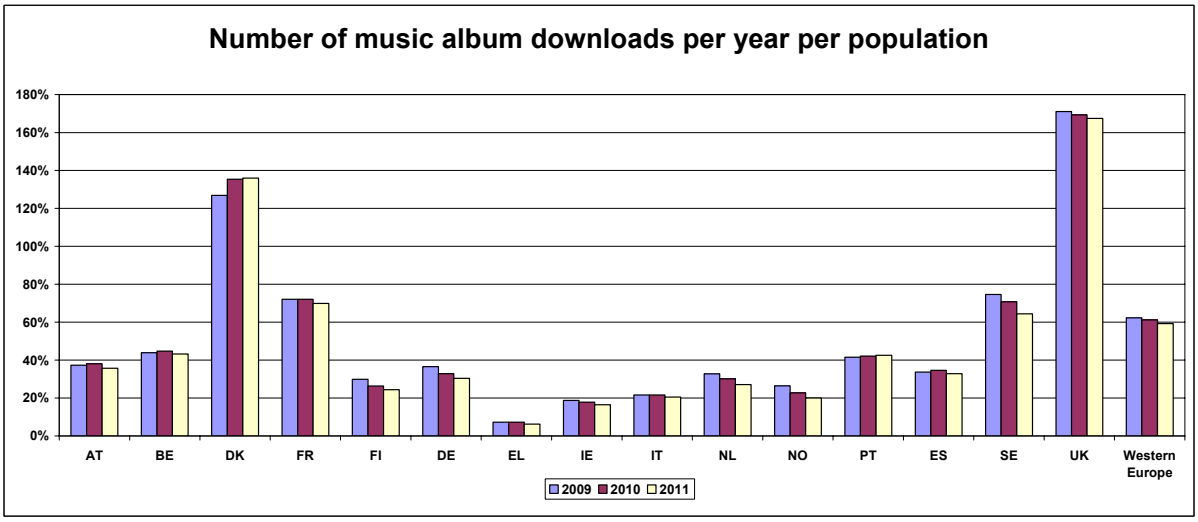
[27] According to IFPI's " Digital Music Report 2012 ", at the start of 2011 the biggest digital music services were present in 23 markets and today they are present in 58 markets; iTunes opened for business in 28 new markets in 2011, including all members of the EU and 16 countries in Latin America; Spotify launched in the US and four European countries and is now present in 12 countries; Deezer has launched in 25 countries in Europe; Sony's Music Unlimited is now available in 13 countries and rara.com announced a new streaming service in 20 countries in December 2011.

Figure 29



Source: EC services based on IHS ScreenDigest

Figure 30



Source: EC services based on IHS ScreenDigest

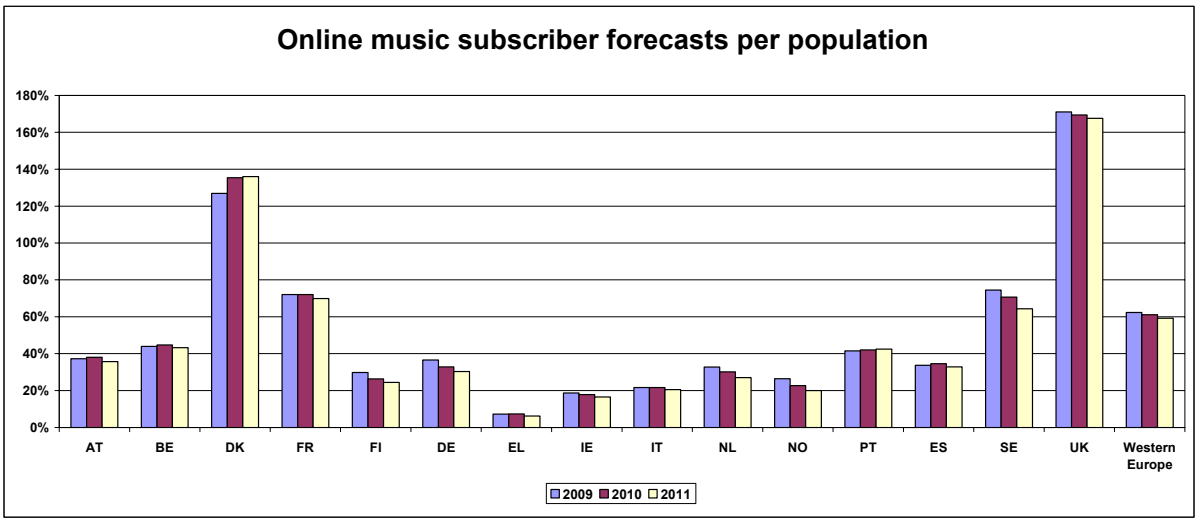
It is significant that despite the strong differences in the number of single or album downloads per country, the average price per single or per album download does not differ very much from one country to another. For a single music download, the average 2011 price in Denmark was EUR 1.20 -- 20% more expensive than the cheapest average price, which can be found in France. However, on average, the price in most Member States where data are available was around EUR 1.15. Prices were much cheaper in the Czech Republic, Poland and Hungary (between 62 and 90 cents) but the volume of the market in these countries is not yet comparable. The price level in the latter countries is similar to that of the US and Canada.

In the case of album downloads the situation is less homogeneous, with the difference between the cheapest and the most expensive prices being more than one third: the lowest average price of around EUR 9 was found in France and the UK, while in Ireland or Germany consumers paid EUR 12.30. Where differences are less significant is in the case of the

average annual cost of online music subscription where prices fluctuate from EUR 154 in the UK and EUR 166-168 in most other countries[28].

As indicated above, market data predict a slow decline in the absolute number of online music subscribers from a peak of 251 million in 2009; the total number of subscribers could go down to 202 million in 2014[29] (Figure 31).

Figure 31



Source: EC services based on IHS ScreenDigest

The growth of downloads is matched by data from the music industry on digital music revenues to record companies. These revenues grew by 8% globally in 2011 to an estimated 3.95 billion euro[30]. This compares to growth of 5% in 2010 and represents the first time the year-on-year growth rate has increased since IFPI started measuring digital revenues in 2004.

According to the IFPI, around 3.6 billion downloads were purchased globally in 2011, an increase of 17% (combining singles and albums downloads). In some markets like the US (52%) and South Korea (53%) more than half of their revenues derive from digital channels, which now account for an estimated 32% of record company revenues globally, up from 29% in 2010. Digital sales were also higher than CD sales in Sweden and Norway in 2011. IFPI says that many major markets had positive growth both in single track download sales and albums and that the global number of paying subscribers for music services grew by 65% from an estimated 8.2 million in 2010 to over 13.4 million in 2011.

1.3.3. Online movies

Compared to the online music market, the market for online movies has developed more slowly due, among other factors, to the need for faster broadband connections and the more limited availability of commercial platforms offering access to this type of content. Another element is the availability of IPTV, which has developed in Europe along with the increasing

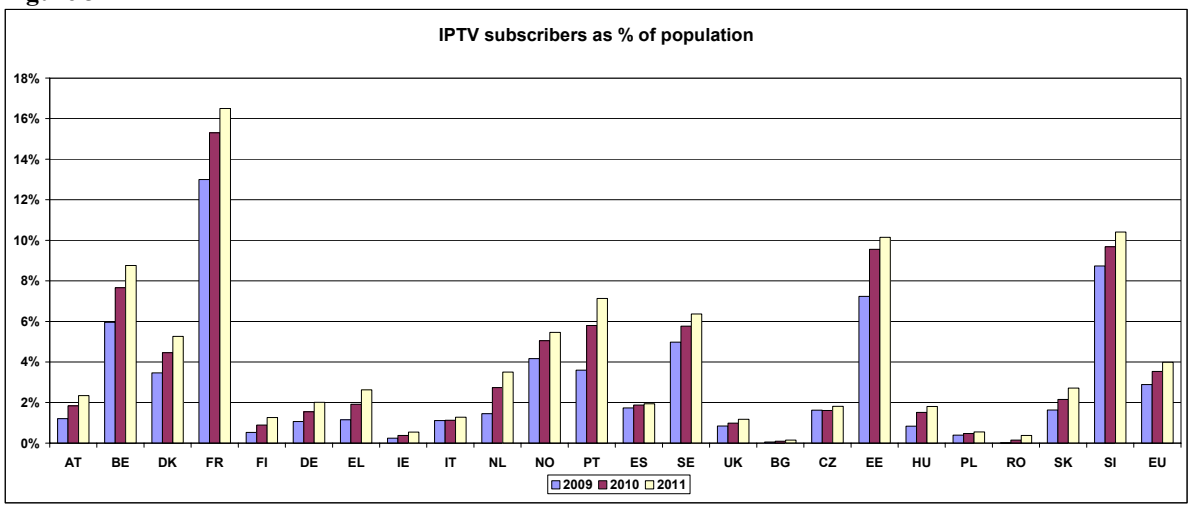
[28] Source: IHS ScreenDigest. Data on annual cost of online music subscriptions only include Austria, Belgium, France, Germany, Ireland, Italy, the Netherlands, Spain, Sweden and the UK.

[29] These figures refer to online-only subscribers (i.e exclude cross-platform subscribers).

[30] IFPI Digital Music Report 2012

presence of broadband bundles combining internet access, fixed telephony and television. Many of the IPTV offerings include premium services that offer thematic channels.

Figure 32



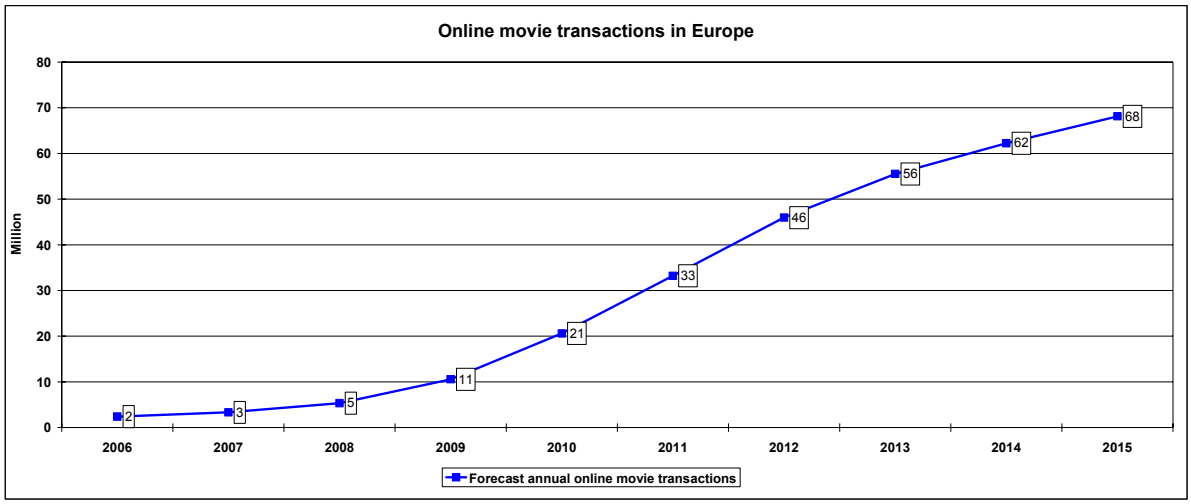
Source: EC services based on IHS ScreenDigest

It is estimated that in 2011 there were almost 20 million IPTV subscribers in the EU. France is by far the leading country by subscribers with half of the EU total followed by Germany with 8% of the total. Relative to its national population, France is also the most advanced country, with 16 IPTV subscribers per 100 people; Slovenia and Estonia follow with a 10% penetration, and Belgium, Portugal and Sweden make a third group, with rates between 8 and 6 percent. In many other countries the IPTV market still has to develop, and at the EU level the penetration rate in 2011 was estimated at just 4% of the population, which seems a very low figure compared to the broadband penetration rate of 27.8% and especially the increasingly higher speeds available. It is, however, expected that online television (understood as video to TV) will be one of the fastest growing segments in the next years (cfr. Figure 14) and that it will represent 17% of all video traffic by 2015. As of March 2011, around 11% of fixed broadband products in the EU were made of bundles of internet access and IPTV.

Another non-negligible factor is the fact that despite the availability of new delivery channels, these are not yet having a clear impact on consumer patterns and linear TV remains by far the most common way of TV viewing in Europe.

Market data thus show a steady but not impressive growth in the number of online movie transactions, with the highest increases occurring between now and 2013. The UK (30%), France (22%) and Germany (19%) are expected to take the largest shares of this market.

Figure 33

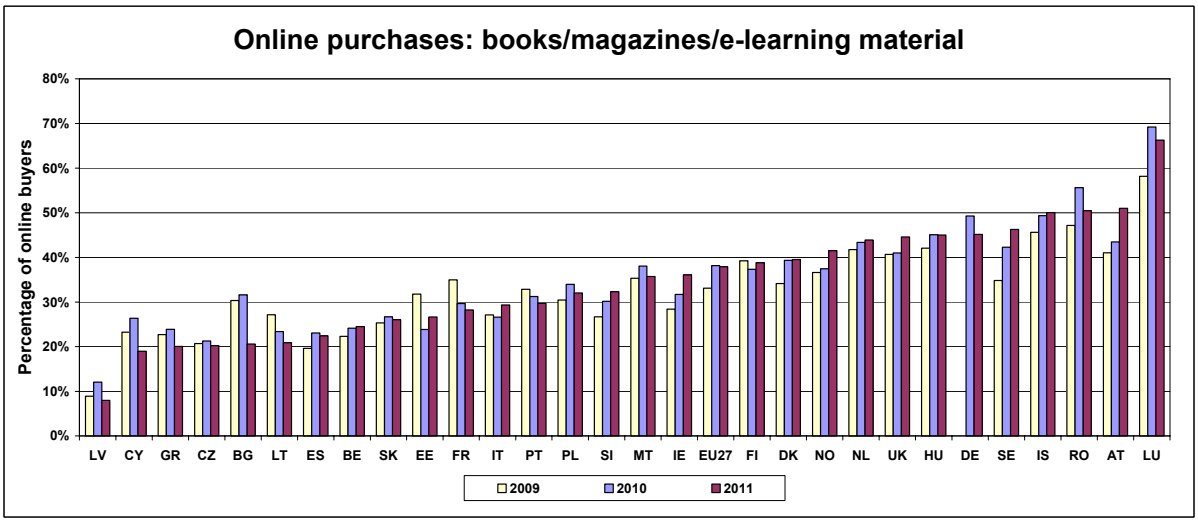


Source: IHS ScreenDigest

1.3.4. Books, magazines, newspapers (including e-books)

Downloads of books, magazines and newspapers follow some different patterns to other products: differences between Member States are less contrasted and there is a different distribution in terms of countries with the highest number of users. Luxembourg is clearly ahead of the other countries with 66% of e-shoppers purchasing these products (Figure 34), followed by Austria and Romania with half of e-buyers declaring that they have bought books, magazines and e-learning material. Almost forty percent of European e-buyers said they had purchased a book, a magazine or any kind of e-learning material in the last twelve months, with no real change since 2010. This figure is similar to that in the US. There are very different patterns among countries, with a few countries having experienced growth (Austria, Sweden, the UK, Norway and Ireland), while in most other countries growth was flat or negative.

Figure 34



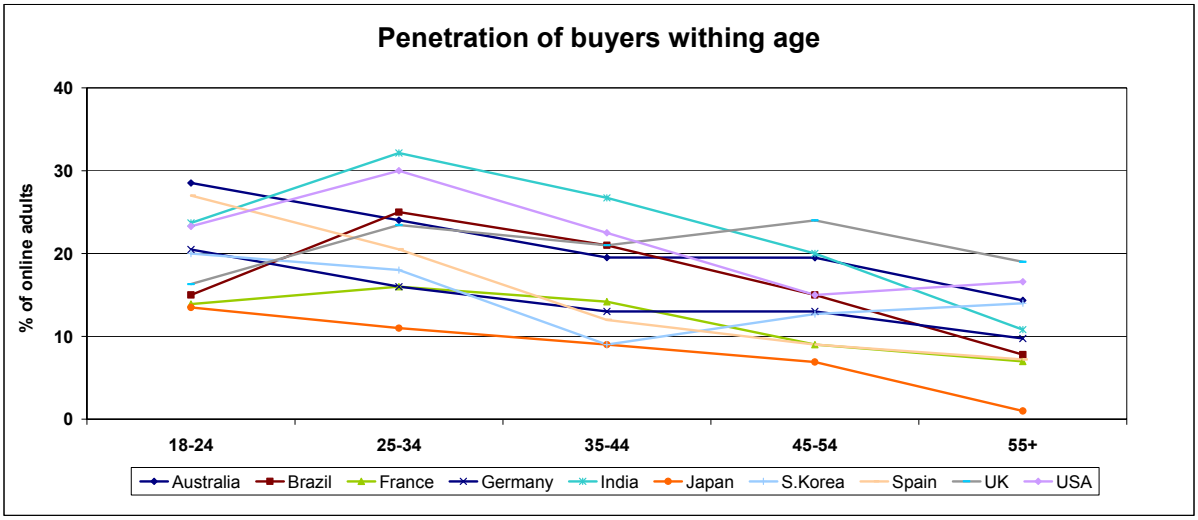
Source: Eurostat

In 2011, there was a significant boost in the e-book market with a 67% increase in the shipment of e-book readers. According to EITO there were 2.0 million e-readers sold in the EU in 2011 and a double-digit growth is expected in 2012. Tablets should be added to these as the main devices for reading electronic books to have a clear idea on the penetration of these devices.

Yet this increase does not appear to have driven a corresponding growth in the number of e-books downloaded by consumers. The Digital book market in the US was worth EUR 482 million; in Denmark, the UK, France, Spain and Italy combined, it was EUR 350 million in 2010[31]. In the US it is estimated that around one fifth of adults have read an e-book in the last twelve months[32] and that the e-book market grew from 0.6 % of the total market share in 2008 to 6.4% in 2010[33]. Outside the US, figures suggest that e-book sales still make up an insignificant proportion (around 1% in 2010) of book sales in most OECD countries: for France, e-books are estimated to represent 0.5% of overall sales, and figures below 1% are estimated for Germany or Italy.

Some recent research has found that only about one fifth of consumers have actually downloaded and paid for an e-book, a low figure that contrasts with the high level of awareness about the possibility of buying e-books (Figure 36). As with many other digital devices, content and applications, adoption of e-book readers seems to be driven by the youngest cohorts (Figure 35)[34].

Figure 35



Source: Bowker

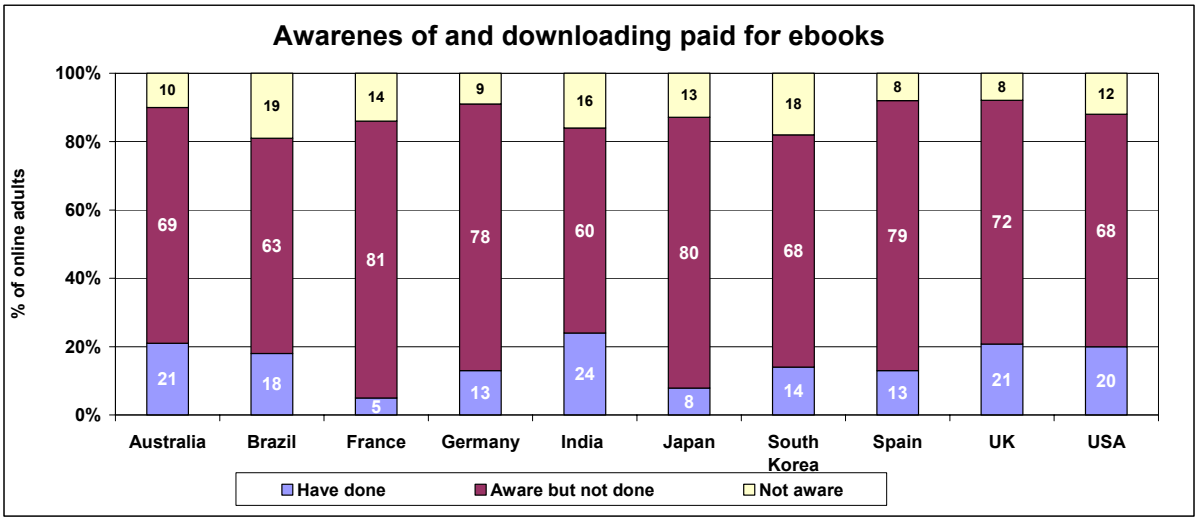
[31] Idate DigiWorld Yearbook 2011

[32] Pew Internet Research, *The rise of e-reading,* April 2012.

[33] OECD, *E-Books: Developments and Policy Considerations*. In May 2011 Amazon announced that since April its sales of ebooks had overtaken sales of all forms of print books combined. Starting in April it had sold 105 ebooks for every 100 print books.

[34] Despite the figures currently available, the launch at the end of 2010 and during 2011 of dedicated e-reader devices as well as of major selling platforms that sell e-books in local languages could bring a significant change in the e-book market.

Figure 36

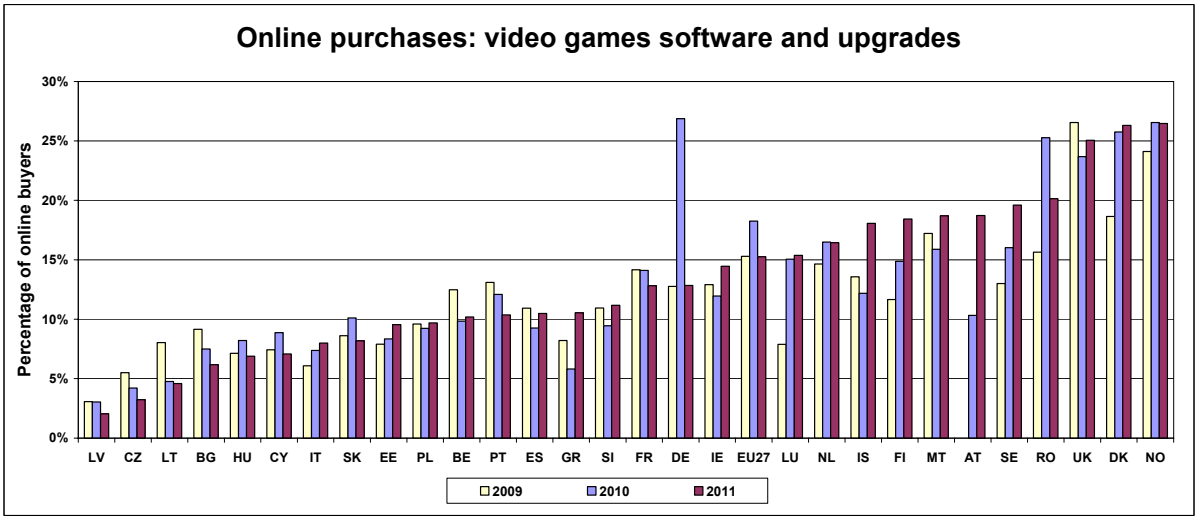


Source: Bowker

1.3.5. Video games software and upgrades

One quarter of users bought video games online in Norway, Denmark and the UK in 2011 and approximately one in five users in Romania, Sweden, Austria, Malta, Finland and Iceland. At the EU level, 15% of internet users purchased video games in the last twelve months (Figure 37). Although this level is lower than in the case of online music and movies or books and magazines, it is a very high level considering the unit price level of many video games. It is estimated that out of the total expenditure on various entertainment content in 2010, games took the second position after Pay TV and ahead of video and cinema with around 36.5 billion euro, i.e. 16% of the total[35].

Figure 37



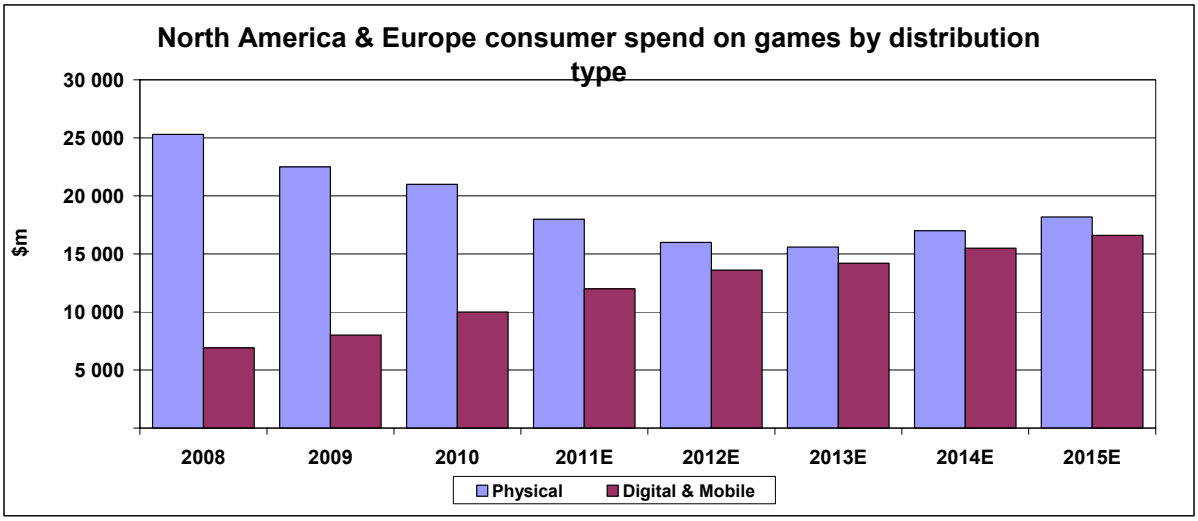
Source: Eurostat

As indicated above, the software and games segment is one of the best examples of the transition in delivery modes from physical to purely online distribution. Figures on sales of

[35] IHS ScreenDigest

packaged games for personal computers and video streamed games on demand in Western Europe confirm this trend: from a peak of 69 million physical units sold in 2004, sales are expected to reach just 35 million in 2015; conversely, video streamed games are expected to jump from 0.36 million transactions in 2011 to 7.7 millions in 2015[36] and sales of downloadable core PC games will also increase from 2.14 millions in 2007 to 27.13 million in 2015. According to market analysts, these segments will experience the biggest growth in the games business, while distribution of physical media games will continue to fade.

Figure 38



Source: IHS ScreenDigest.

Mobile games are another market segment poised to grow significantly in the near future, linked to the explosion of smartphones and tablets. In 2010, the value of the market for games delivered by mobile applications stores was estimated at EUR 0.9 billion, a figure expected to reach almost six billion in 2015 with free and social mobile applications having a growing share of the market.

1.4. The use of e-commerce by enterprises

Target: 33% of SMEs should conduct on-line purchases/sales by 2015

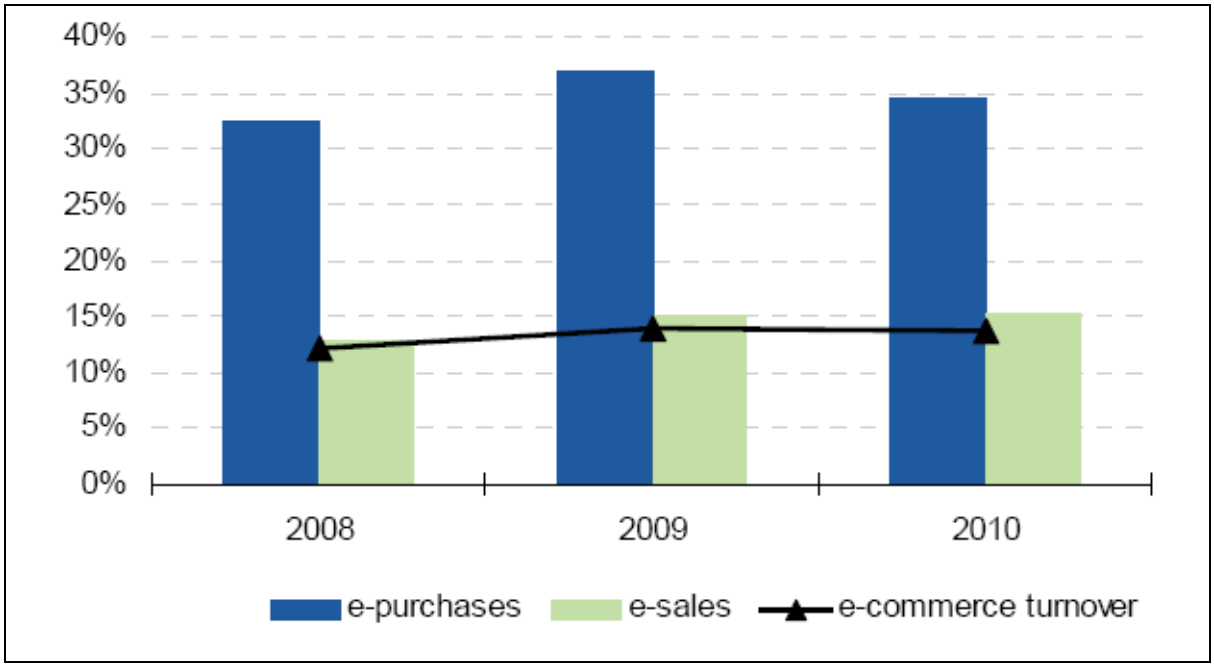
The share of turnover from e-commerce, i.e. the trading of goods or services over computer networks such as the Internet, was stable at 14% in 2009 and 2010. E-commerce continues to be a small part of the business model of enterprises, complementing their conventional commercial activities for selling and buying and aimed at enhancing their performance.

In 2010, more than twice as many enterprises engaged in e-commerce purchases than in e-commerce sales. As shown in Figure 1, during 2010, 35% of enterprises in the EU27 made purchases electronically – e-purchases. In the same period, only 15% of enterprises made electronic sales – e-sales.

[36] IHS ScreenDigest. Video streamed games on demand include only fully streamed games services that do not require any downloading.

The percentage of turnover on e-sales amounted to 14% of the total turnover of enterprises with 10 or more persons employed in the EU27.

Figure 39; E-commerce sales and purchases, turnover from e-commerce, 2008 to 2010, EU27, (% of enterprises, % total turnover)

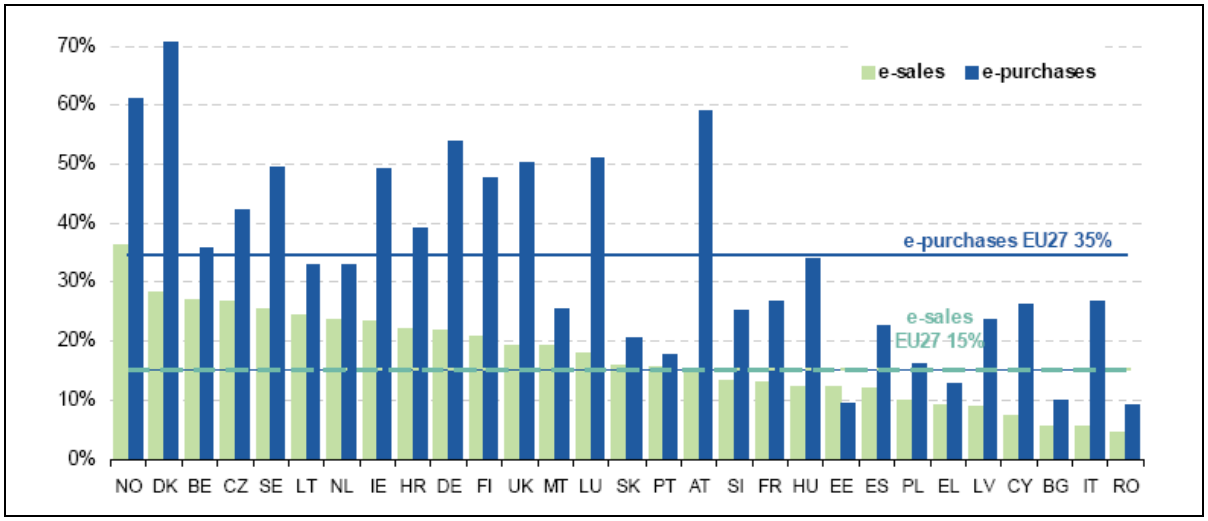


Source: Eurostat

Thirty-seven percent of large enterprises made e-sales, corresponding to 19% of total turnover in this size class. Similarly, 23% of medium sized enterprises made e-sales, corresponding to 10% of total turnover in this size class. By contrast, 13% of small enterprises engaged in e-sales, corresponding to only 4% of the turnover of such enterprises. In the EU27, during the period 2008 to 2010, there was a small increase in the percentage of enterprises that had purchases or sales electronically (both +2 percentage points), and also in the percentage of turnover on e-commerce sales (+2 percentage points). Changes were more noticeable depending on the size of enterprises.

Among all countries, the percentage of enterprises making purchases electronically varied widely from country to country, ranging from 9% in Romania to 71% in Denmark. Similarly, the percentage of enterprises with e-sales ranged from 4% in Romania to 36% in Norway, followed by Denmark (28%), Belgium and the Czech Republic (both 27%).

Figure 40: E-commerce sales and purchases, 2010 (% of enterprises)



Source: Eurostat

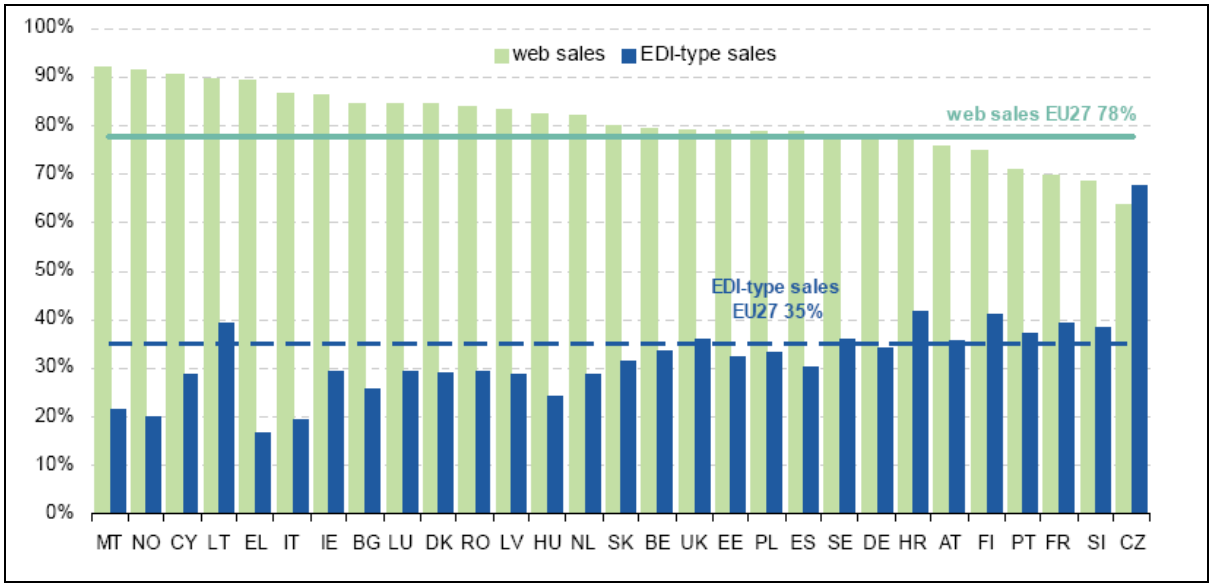
In 2010, the percentage of turnover from e-commerce ranged from 1% in Cyprus to 25% in the Czech Republic, followed by Finland (20%), Sweden and Hungary (both 19%). In nine out of the 29 countries (EU27, Norway and Croatia), enterprises realised more than 15% of their total turnover from e-commerce sales during 2010. However, within this group of countries, there was a significant variation in the percentage of enterprises selling electronically, ranging from 12% in Hungary to 36% in Norway.

Similarly, regarding the percentage of enterprises purchasing electronically, the proportions within the same group of nine countries ranged from 21% in Slovakia to 61% in Norway.

E-commerce sales can be broadly divided into web sales and EDI-type sales (Electronic Data Interchange or Extensible Markup Language (XML) format for example), referring to the way customers – private or business – place orders for the products that they wish to purchase. Websites are increasingly offered by enterprises or third parties for various purposes. In particular, websites allow customers to purchase by placing their orders electronically.

In 2010, 78% of enterprises selling electronically in the EU27 used a website (Figure 41: E-commerce sales broken down by web and EDI-type sales, 2010 (% of enterprises with)), while 35% used EDI-type sales. The percentage of enterprises that used EDI-type sales ranged from 17% of enterprises conducting e-sales in Greece to 68% in the Czech Republic. The percentage of enterprises receiving orders over websites was considerably higher for almost all countries, ranging from 64% in the Czech Republic to 92% in Malta.

Figure 41: E-commerce sales broken down by web and EDI-type sales, 2010 (% of enterprises with e-sales)

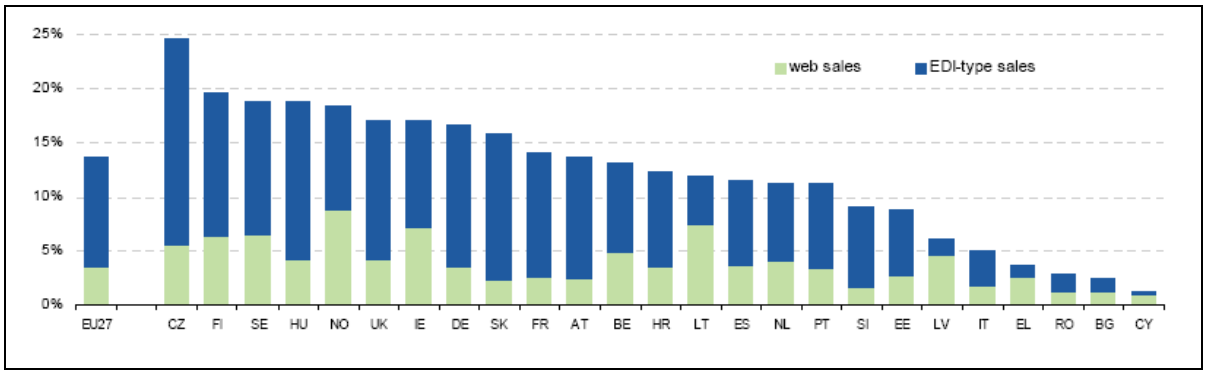


Source: Eurostat

The use of either type of sale is very much related to the sector of activity. Almost all enterprises making e-sales in the 'Travel agency, tour operator reservation service and related activities' branch received orders via a website, while 17% made e-sales via EDI-type messages. More than half of 'Manufacturing' enterprises making e-sales reported that they received orders via EDI-type messages, followed closely by enterprises in the 'Transport and storage' sector (46%). The percentages for 'Manufacturing' enterprises that conducted e-sales via a website and via EDI-type messages were very close: 58% and 56% respectively. For all other economic activities, enterprises received their orders in most cases via websites.

The use of EDI also means that the share of turnover from this type of sale is greater than that from web sales; the turnover realised from EDI-type sales was 10% of total turnover, while the turnover from web sales was only 4%.

Figure 42: Turnover from e-commerce broken down by web and EDI-type sales, 2010 (% of total turnover)



Source: Eurostat

2. FAST AND ULTRA-FAST INTERNET ACCESS

- The broadband market grew in 2011 but the growth rate continued to slow down. The fixed broadband penetration rate in January 2012 was 27.7% of the population, just 1.3 percentage points up from 26.4% in 2011.

- Despite the slower growth, the EU penetration rate exceeded that of Japan in 2011 for the first time. The difference with the US is 0.5 percentage points behind only.

- Speeds of fixed broadband lines increased significantly in 2011 with almost 50% of all lines providing download speeds of 10 Mbps and above.

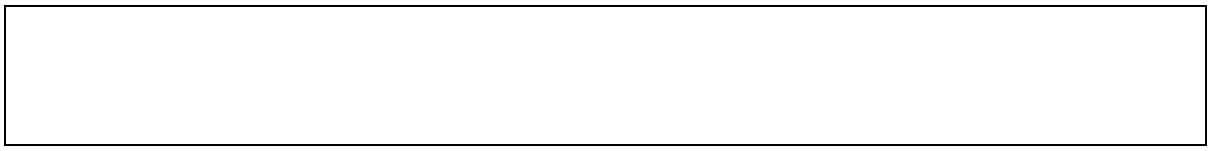
- But the take up of fast and ultra-fast broadband, i.e. 30 Mbps and 100 Mbps, is still low with just 7.2% and 1.3% (respectively) of all fixed lines providing those speeds.

- In the second half of 2011, the number of new broadband lines based on xDSL was almost equal to the number of new lines based on alternative technologies sold both by new entrants and incumbents, indicating a shift towards other technologies closely linked to Next Generation Access Networks (NGAs) and capable of providing faster speeds.

- In 2011 there was an explosion in mobile broadband with penetration reaching 43% of the population in January 2012 from 26.8% in January 2011. This growth was fuelled by handheld devices; there were 35.1 mobile broadband connected handheld devices per 100 citizens in January 2011, up from 19.6 in 2011.

- Data revenues increased by 22.6% in Q3 2011 compared to Q3 2010 in the five largest Western European markets[37]. LTE (Long-term evolution) networks are already available in eight EU Member States and mobile broadband traffic is already more than twice as high as fixed traffic and is expected to grow exponentially in the coming years.

[37] Based on Q3 2011 operators' financial reports



2.1. The need for fast broadband

The Digital Agenda for Europe set three major targets on broadband: basic broadband networks should be available to all EU citizens by 2013 and by 2020 half of European households should subscribe to at least 100 Mbps, while 30 Mbps should be available to all Europeans. As the 2013 target is mostly achieved, the Digital Agenda has a clear focus on migration to faster speeds.

Targets are expected to be achieved through the deployment of a mix of technologies: wireline and wireless. Rollout of fast broadband in the EU has just started, but the rapid diffusion of broadband (the quickest among ICTs) suggests that the achievement of the 2020 targets should be feasible, despite the current economic downturn.

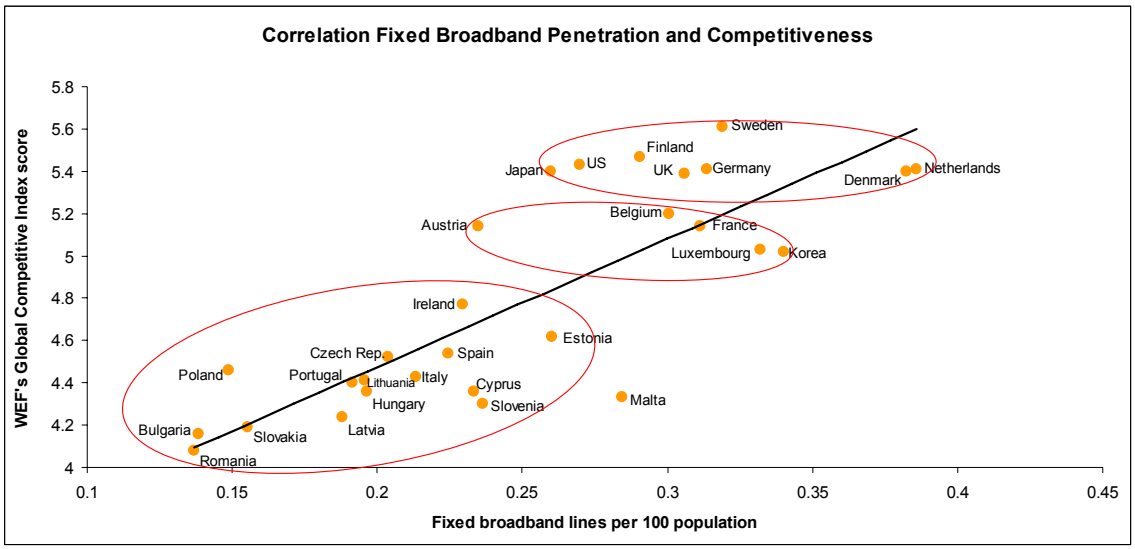
Widespread use of faster speeds is considered a crucial factor to realise economic growth and to have an impact on job creation (Figure 43). Evidence shows that a 10% increase in the broadband penetration rate yields a GDP impact of around 1%.[38] Because of a lack of empirical evidence, the economic literature has not yet delivered firm conclusions on the impact of a migration to faster speeds. However, positive effects can be discerned. First, the construction of broadband networks creates jobs and generates investment (it is estimated that 60-80% of the total cost of broadband deployment is linked to duct work, which is rather labour intensive, see table 2). Secondly, the adoption of broadband by firms yields efficiency gains which contribute to growth of GDP (through Multifactor Productivity growth)[39]. Third, high-speed internet stimulates the development of new services applications creating new markets. Finally, residential users receive a benefit in terms of consumer surplus, which is not directly related to GDP but which breeds from improved access to information, entertainment and public services.

Research is starting to pinpoint different employment effects by industry sector. Broadband may simultaneously cause labour creation triggered by innovation in services and a productivity effect in labour intensive sectors. Nevertheless, we still lack a robust explanation of the precise effects by sector and the specific drivers in each case. However, given that the sector composition varies by regional economies, the deployment of broadband should not have a uniform impact across a national territory.

[38] Czernich, N., Falck, O., Kretschmer, T. and Woessmann, L. (2011), Broadband Infrastructure and Economic Growth. The Economic Journal, 121: 505–532. doi: 10.1111/j.1468-0297.2011.02420.x

[39] Broadband is an enabling technology and by itself does not have an economic impact. Its impact on efficiency gains materialises as the adoption of broadband is accompanied by a number of organisational changes, including training and other cultural factors (known as "intangible capital"). Hence, its impact appears with a lag relative to the moment of adoption.

Figure 43: Correlation between penetration of fixed broadband and competitiveness



Source: EC services based on COCOM and WEF

Estimates on job creation vary but point in a positive direction. For example, in relation to broadband deployment in the EU, it was estimated that 440,000 jobs would be created in the business services sector in 2006 and 549,000 jobs in other economic sectors due to broadband-related innovation in knowledge-intensive activities. This employment creation would compensate for the loss of jobs due to process optimisation and structural displacements within the economy, with a net creation of 105,000 jobs in 2006 in Europe[40]. In the United States, for every one percentage point increase in broadband penetration in a state, employment was projected to increase by 0.2 to 0.3 percent per year. For the entire US private economy, this suggests an increase of about 300,000 jobs[41].

With regard to higher speed networks, investment in NGAs can deliver important countercyclical effects, both as a result of network construction and in relation to spill-over impacts on the rest of the economy. While the former is likely to be concentrated in the construction and electronic communications sectors, the impact of externalities is greater in service sectors and in particular in those characterised by high transaction costs (such as financial services).

[40] Source: The Impact of Broadband on Growth and Productivity, Micus Management Consulting Gmbh, 2008

[41] Source: The Effects of Broadband Deployment on Output and Employment: A Cross-sectional Analysis of U.S. Data, The Brookings Institution, 2007 (figures refer to growth excluding the non-farm economy)

Table 2 — Broadband impact on job creation, Source: ITU

COUNTRY	RESEARCHER/ INSTITUTION	STIMULUS INVESTMENT (US$ million)	NETWORK DEPLOYMENT JOBS ESTIMATE			
			DIRECT	INDIRECT	INDUCED	TOTAL
UNITED STATES	Katz (Columbia)	$ 6,390	37,300	31,000	59,500	127,800
	Atkinson (ITIF)	$ 10,000	63,660	165,815		229,475
SWITZERLAND	Katz (Columbia)	~$ 10,000	~80,000	~30,000	N.A.	~110,000
GERMANY	Katz (Columbia)	$ 47,660	281,000	126,000	135,000	542,000
UNITED KINGDOM	Liebenau (LSE)	$ 7,463	76,500	134,500		211,000
AUSTRALIA	Government	$ 31,340	-	-	-	~200,000

Source: ITU42

2.2. The fixed broadband market

2.2.1. Broadband coverage by 2013

The DAE's aims is for all European citizens to have access to basic broadband by 2013 and access at speeds equal to or higher than 30 Mbps by 2020. Coverage of networks capable of providing speeds of 30 Mbps and above is estimated at 50% at the end of 2011.

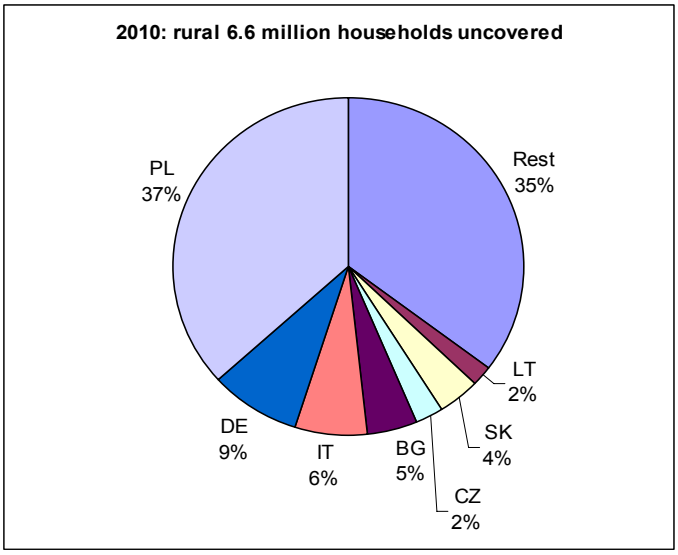
The coverage of DSL networks was 95% at the end of 2011 with the growth of the EU average staying flat during 2011.

Coverage in rural areas is typically lower than in urban areas; 70% (6.6 million households) of the 9.4 million unconnected households are in rural areas in 2010[43]. A breakdown by country shows that most of the unconnected households in rural areas are in Poland (37%), followed by Germany (9%) and Italy (6%). (Figure 44)

[42] The Impact of Broadband on the Economy: Research to Date and Policy Issues, Raul Katz, 2010, http://www.itu.int/ITU-D/treg/Events/Seminars/GSR/GSR10/documents/GSR10-ppt1.pdf

[43] 2011 data on coverage per Member State not available

Figure 44: Non covered rural households in the EU



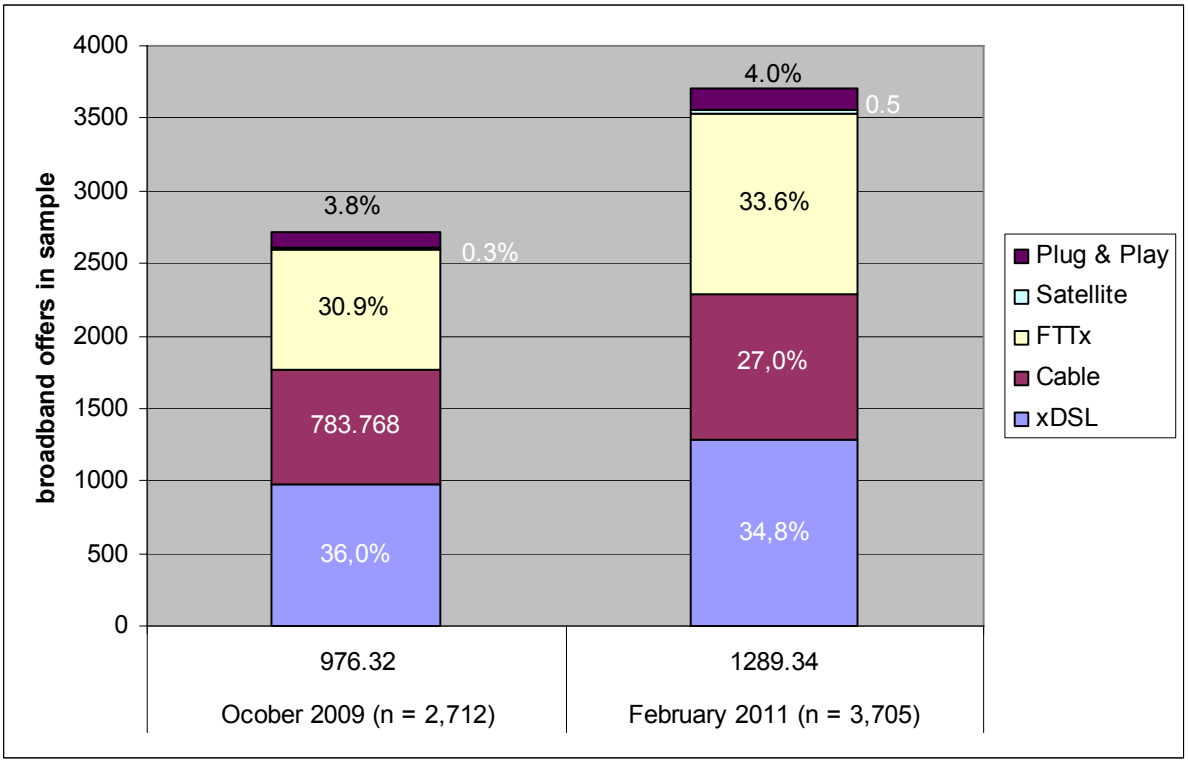
Source: EC services based on IDATE

Satellite could provide access to basic broadband to the rest of population. In the longer term, all territory should be covered with fast broadband offering at least 30M bps. To achieve this target, carriers may use different technologies, wireline and wireless.

Data on satellite coverage is not available, but it is clear that less populated areas of Europe will need to rely on access through satellite. A new generation of satellites can provide faster internet to more users in principle everywhere in the EU. At present the capacity of existing broadband by satellite appears sufficient to connect the bulk of the unconnected population. However, as satellite broadband access capacity depends on the combination of the number of users and the average broadband speed, it is difficult to estimate the real availability of broadband by satellite. Also there are some limitations with broadband satellite, related mainly to installation and equipment costs, in particular the installation of the satellite dish, which is relatively expensive compared to other broadband technologies. In February 2011 out of a database of more than 4000 retail broadband products, only 0.5% (15 products) of these were based on satellite (Figure 45). Satellite broadband products offer speeds that go from 144 kbps to 4 Mbps and the median price per month is on average above the price of products based on other technologies[44].

[44] Study on Broadband Internet access costs, VanDijk, August 2011.
http://ec.europa.eu/information_society/digital-agenda/scoreboard/docs/pillar/biac_reporting_tool.xlsx

Figure 45: Breakdown of the offers in terms of different technologies



Source: Broadband Internet Access Cost (BIAC)

2.2.2. National policies to stimulate rollout: Broadband National Plans and public funding

In its Broadband Communication[45], the Commission stressed the importance of all Member States having an operational broadband plan with defined national targets aligned with the European broadband targets. The Communication also underlined the need for a balanced set of policy actions to incentivise investment in fast and ultra-fast internet, in particular resulting from a consistent and thorough implementation of the EU regulatory framework for e-communications, the uniform implementation of the Radio Spectrum Policy Programme, adequate cost reduction measures and the coherent application of the State Aid Broadband guidelines[46]. To support the development of these plans, the Communication included a commitment to review national broadband plans as part of its Digital Agenda governance.

In spring 2012, the European Commission thoroughly assessed national broadband plans[47], summarising the current state of play in national broadband plans and aiming at fostering a mutually beneficial exchange of knowledge on good practices between countries by assembling examples of national implementation measures.

First, regarding basic broadband, eight Member States (Denmark, Finland, France, Luxembourg, Latvia, Malta, Netherlands, United Kingdom) have already achieved full coverage with basic broadband services and a further 17 countries have set a corresponding

[45] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52010DC0472:EN:NOT
[46] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52009XC0930(02):EN:NOT
[47] http://ec.europa.eu/information_society/newsroom/cf/item-detail-dae.cfm?item_id=7948

quantitative target or are about to do so. There is a range of definitions of 'basic' with download speeds from 512 Kbps to 4 Mbps. In many cases the timing is more ambitious than the DAE deadline of 2013 but not all plans envisage full basic coverage by this date.

Second, as for NGA coverage, 21 Member States have so far defined quantitative coverage objectives for the deployment of NGA with download targets ranging from 25Mbps to 1Gbps and with coverage footprints between 75% and 100% of households or population. A rare case is Luxembourg with an ultimate NGA target of 1Gbps/0.5Gbps (download/upload) by 2020. Plans are currently being revised in several Member States.

Third, in terms of demand for NGA, only those five (Cyprus, Hungary, Italy, Lithuania, Portugal) that have fully subscribed to the DAE targets have integrated take-up targets into their broadband plans. The few making such commitments reflect the belief that demand will follow supply and hence a policy that leads to the desired supply is all that is needed. But a number of Member States question the rationale for ultra-fast broadband subscription targets, claiming there is little evidence of market failure and no visible externalities associated with a connectivity subscription as such. This group tends to either neglect or disagree that widespread use of high speed connectivity may be a precondition for the development of new applications which are not necessarily known today or that, already today, simultaneous use of multiple existing applications may exhaust current bandwidths to their limits.

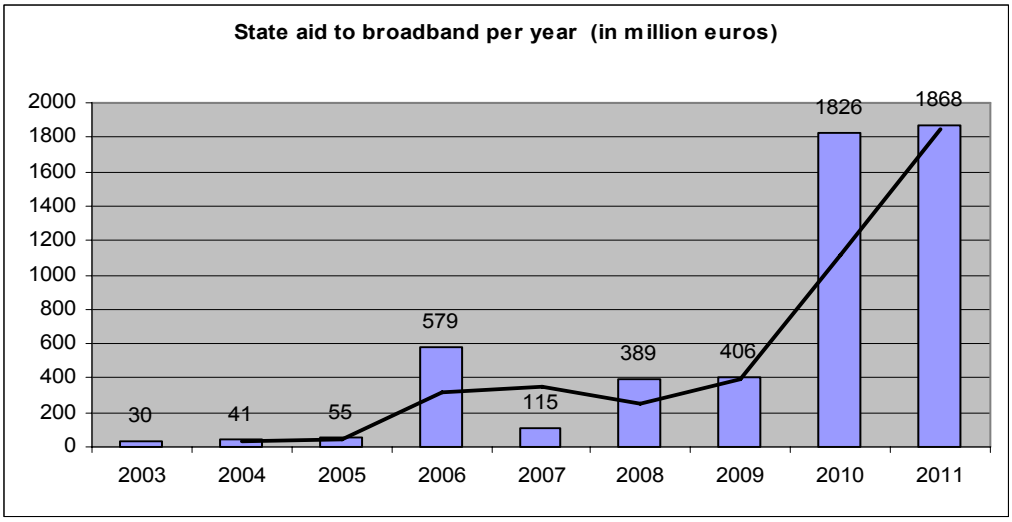
National broadband plans also exist in other industrialised countries outside the EU, focusing as well on spurring NGAs. In the United States, the objective is that by 2020 100 million US households should have affordable access to actual downloads of at least 100Mbps (50Mbps by 2015) and upload speed of at least 50Mbps (20Mbps by 2015). It also targets widespread and world-fastest wireless networks and 1Gbps download speed broadband access service in public institutions such as schools, hospitals and government buildings. In Japan, the Ministry of Internal Affairs and Communications (MIC) targets ultra-fast broadband coverage by the end of 2015. In South Korea, the Korean government intends to connect all homes to the Internet at 1Gbps and cut the monthly price to US$27 a month, down from US$38/month by the end of 2015. In Australia, the National Broadband Network is expected to cover 100% of premises and 93% of homes, schools and businesses at up to 100 Mbps over fibre by 2021, with the remainder at up to 12 Mbps over next generation wireless and satellite.

As regards the deployment of NGAs, there exists a trade-off between the incentives that private operators have in investing in NGAs and the interests of the national regulators to increase competition in the broadband market. Countries are using different strategies in order to attain both deployment and competition in NGAs. Most of the countries in the EU expect telecom operators to deploy NGAs, enhancing competition via mandatory unbundling as is already done with copper networks. A group of countries, such as Sweden, the United Kingdom and Japan have introduced functional separation for fixed broadband networks but not always in association with public investment. Another group of countries (it is the case in Australia) are investing public funds in deploying NGAs. A further group of countries, such as the United States or Korea, rely mostly on private infrastructure-based competition with no (or little) use of unbundling (non mandatory access).

The broadband DAE targets and the *Community Guidelines for the application of State aid rules in relation to rapid deployment of broadband network*[48] (hereafter: "Broadband Guidelines") are closely related and the amount of State funds devoted to broadband networks has increased in the past years. First adopted in 2009, they explain how public funds can be channelled for the deployment of basic broadband networks as well as NGA networks to areas where private operators do not invest due to lack of funds and/or incentives.

The amount of State aid earmarked for broadband networks increased again in 2011 to EUR 1,868 million, slightly above the 2010 record. This shows the increasing importance that the availability of broadband infrastructure is gaining in all Member States (Figure 46).

Figure 46: Amount of State aid authorized per year (in million euros)



Source: European Commission

In 2011, the Commission launched a process to review the Broadband Guidelines in order to keep up with market and technology developments. After the publication of the revised draft Guidelines, a consultation with stakeholders was launched in June 2012[49]. The Commission also commissioned two studies[50] on the implementation of the current Broadband Guidelines through an analysis of cases studies and technological issues.

The revision of the Broadband Guidelines is also part of the State Aid Modernisation[51].

The Commission is currently working on providing guidance on key regulatory concepts such as costing methodologies for setting key wholesale access prices. Such guidance aims to ensure that under equivalent circumstances, access products are priced in a consistent way across the EU while at the same time appropriately taking account of national specificities. The likely instrument will be a recommendation pursuant to Article 19 of the Framework

[48] Text reference 2009/C235/04
[49] http://europa.eu/rapid/pressReleasesAction.do?reference=IP/12/550
[50] Study on the Implementation of the existing Broadband Guidelines, WIK Consult
http://ec.europa.eu/competition/consultations/2011_broadband_guidelines/final_report_en.pdf
Guide to broadband investment, Analysys Mason
http://ec.europa.eu/information_society/newsroom/cf/document.cfm?action=display&doc_id=889
[51] On 8 May 2012, the Commission set out an ambitious State aid reform programme, http://ec.europa.eu/competition/state_aid/modernisation/index_en.html

Directive. A public consultation addressing different costing methodologies for the implementation of cost orientation obligations and incentives to invest in NGA networks was closed at the end of 2011[52].

The Commission is also working on a new initiative that concerns cost reduction. The need for cost reduction measures has already been addressed in the Digital Agenda for Europe, the Broadband Communication, the eCommerce Action Plan as well as in many National Broadband Plans. Many studies suggest that the largest single cost component of deploying networks, going up to 80%, is civil engineering and that these costs could be significantly reduced, among others, by the re-use of existing telecommunications ducts, the sharing of alternative infrastructure owned by other utilities, coordination of civil works across utilities (e.g. water, energy, railways) and/or by proper coordination between national and local authorities. This initiative aims to incentivise NGA rollout and facilitate investments by decreasing the associated costs and administrative burden. Areas of action may include administrative procedures, duct mapping, duct sharing, coordination of civil engineering and in-house equipment. A public consultation was launched in April 2012[53].

In addition, and with the aim to help bridging the funding gap, the Commission has adopted a plan -- the Connecting Europe Facility[54] (CEF) -- to give a EUR 50 billion boost to Europe's transport, energy and digital networks between 2014 and 2020, out of which EUR 9.2 billion will be spent in broadband networks and services in line with EU competition and State aid rules. At least EUR 7 billion out of the EUR 9.2 billion will be available for investment in high-speed broadband infrastructure. Public funds channelled to invest in broadband infrastructure will have positive externalities (such as giving projects credibility and lowering risk) and are expected to leverage between EUR 50 billion and EUR 100 billion of private and public money. The remaining funding (around EUR 2 billion) would support public interest digital service infrastructure such as electronic Government and Health records, electronic identification, electronic procurements, cooperation to take down illegal content, etc.

2.2.3. The fixed broadband market

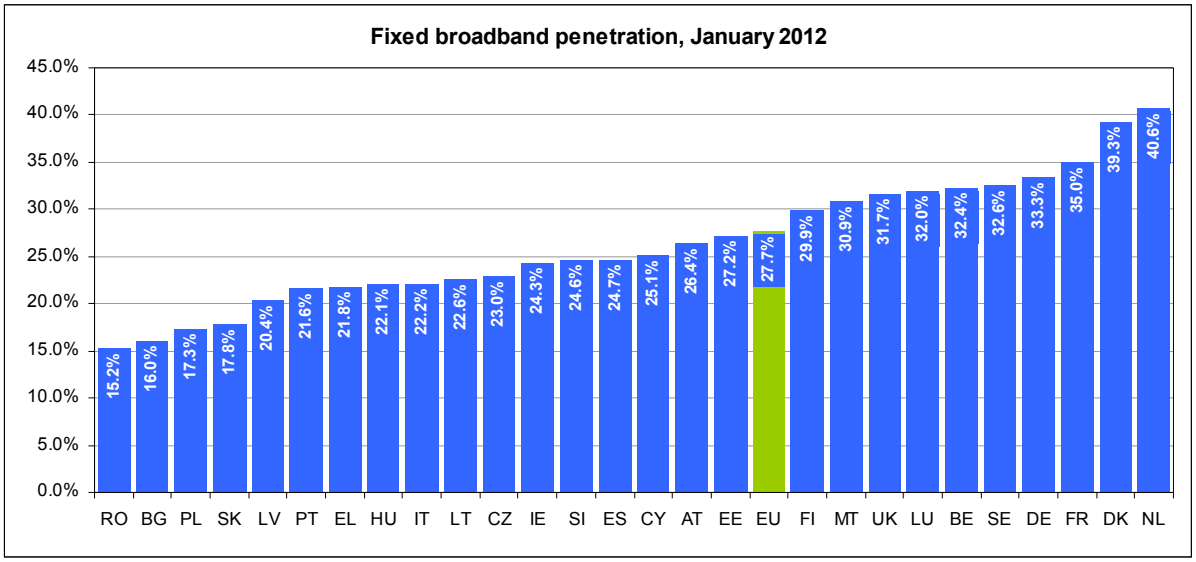
The EU fixed broadband market included more than 139 million fixed broadband lines by January 2012. The EU broadband market continued to grow in 2011 with some 6.7 million new lines (5% year-on-year growth). At the end of 2011, there were 27.7 fixed broadband lines per 100 inhabitants in the EU (Figure 47) with nine countries reaching 30 lines or more per 100 inhabitants.

[52] http://ec.europa.eu/information_society/policy/ecomm/library/public_consult/cost_accounting/index_en.htm

[53] http://ec.europa.eu/information_society/policy/ecomm/library/public_consult/cost_reduction_hsi/index_en.htm , with July 20th as deadline

[54] http://ec.europa.eu/budget/reform/commission-proposals-for-the-multiannual-financial-framework-2014-2020/index_en.htm

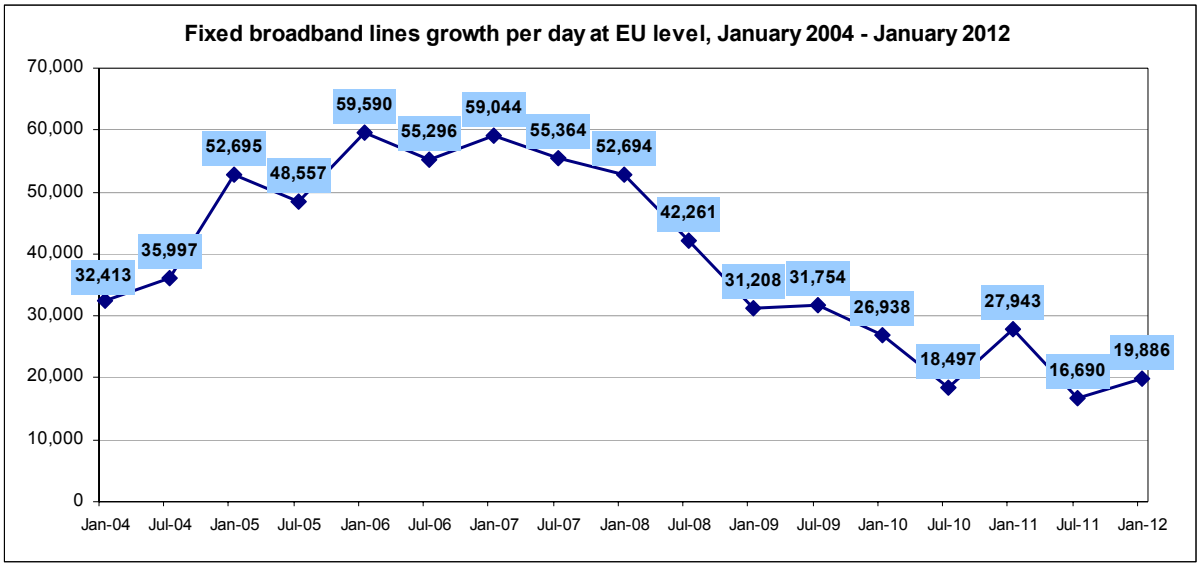
Figure 47: Fixed Broadband Penetration Rate, January 2012



Source: Communications Committee

Despite the increase in the number of fixed lines, the growth rate continues to slow. The penetration rate by population increased by only 1.3 percentage points from January 2011 to January 2012, recording a significant decrease in the number of net additions with respect to January 2011 (19,886 lines per day) (Figure 48). These indicators show that the market is mature and reaching its ceiling in many countries. Countries experienced positive growth in their penetration rates including Finland, which had regressed in previous years.

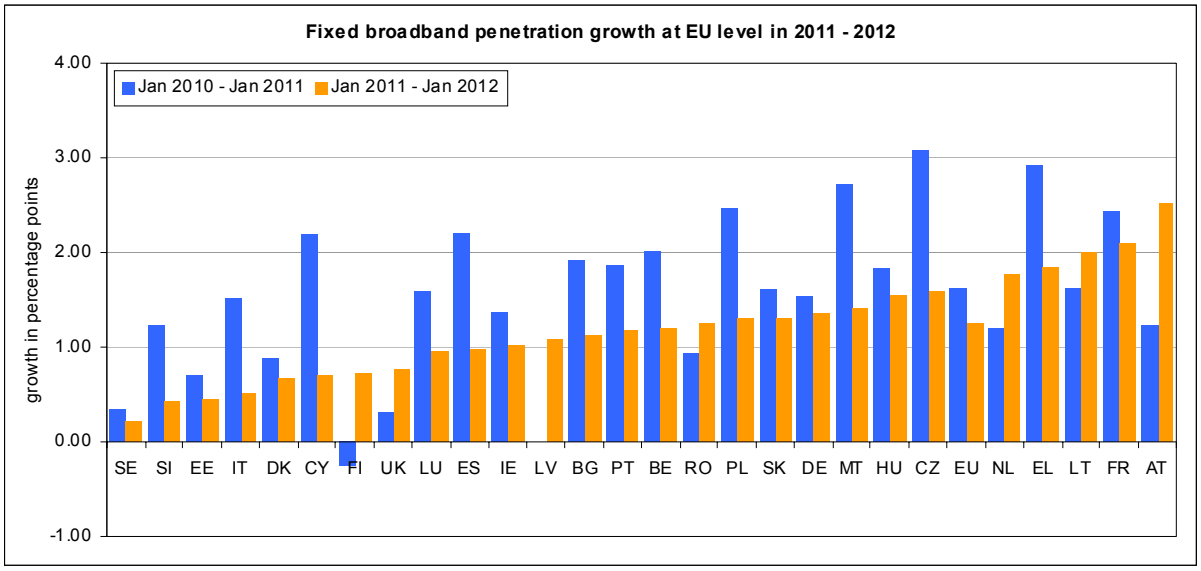
Figure 48: Growth of fixed broadband lines per day



Source: Communications Committee

Overall, the average growth rate in penetration levels in Europe has decreased to 1.3% from 1.6% in the period from January 2010 to January 2011. It seems that a critical mass of the broadband market penetration has been achieved and that the penetration growth rate is diminishing (Figure 49).

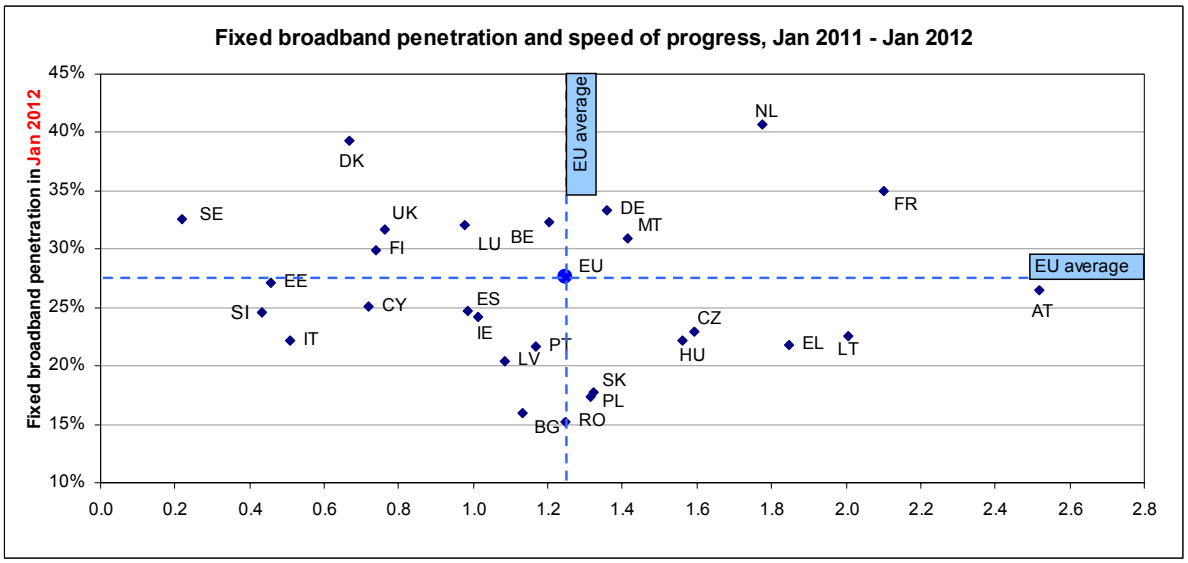
Figure 49: Fixed broadband penetration and speed of progress, 2011-2012



Source: Communications Committee

A group of countries (Slovenia, Estonia, Italy and Cyprus) had very low growth rates and remain below the average EU penetration rate. Some countries with still low penetration rates experienced a boost in their growth: Austria, Lithuania, Greece, the Czech Republic and Hungary. A smaller group of countries with penetration rates above the EU average showed low growth rates: Sweden, Denmark, Finland, the United Kingdom, Luxembourg and Belgium. France was the country with the second highest growth in penetration and is now the country with the third highest penetration level, having overtaken the UK. Growth and penetration rates were also positive in the Netherlands (the highest penetration level in the EU), Germany and Malta. Finally, Bulgaria and Romania have the lowest penetration levels in the EU; their growth rates also lagged behind the EU average (Figure 50).

Figure 50: Growth of fixed broadband penetration in EU Member States, 2010-2012

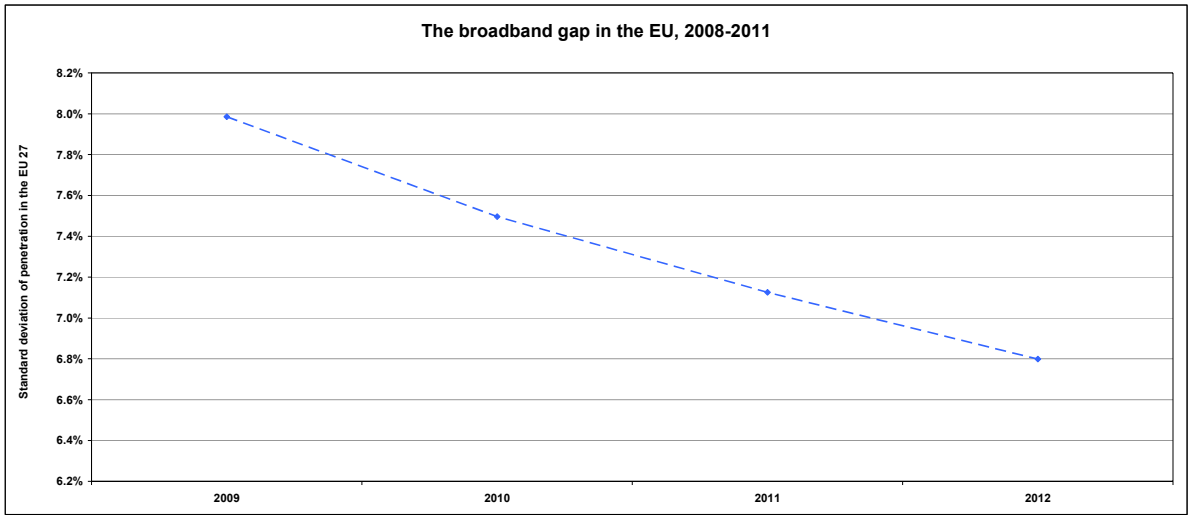


Source: Communications Committee

The broadband gap, a measurement of the dispersion of penetration rates between countries in the EU, continued to decline; the slope was similar to that of 2011 (Figure 51). The broadband

gap is closing partially because the penetration rate in many developed countries did not grow as much as that in countries with penetration levels below the average. The catch-up is very slow for some countries such as Bulgaria, Romania, Poland or Slovakia, and it might take longer than expected.

Figure 51:The broadband gap in the EU

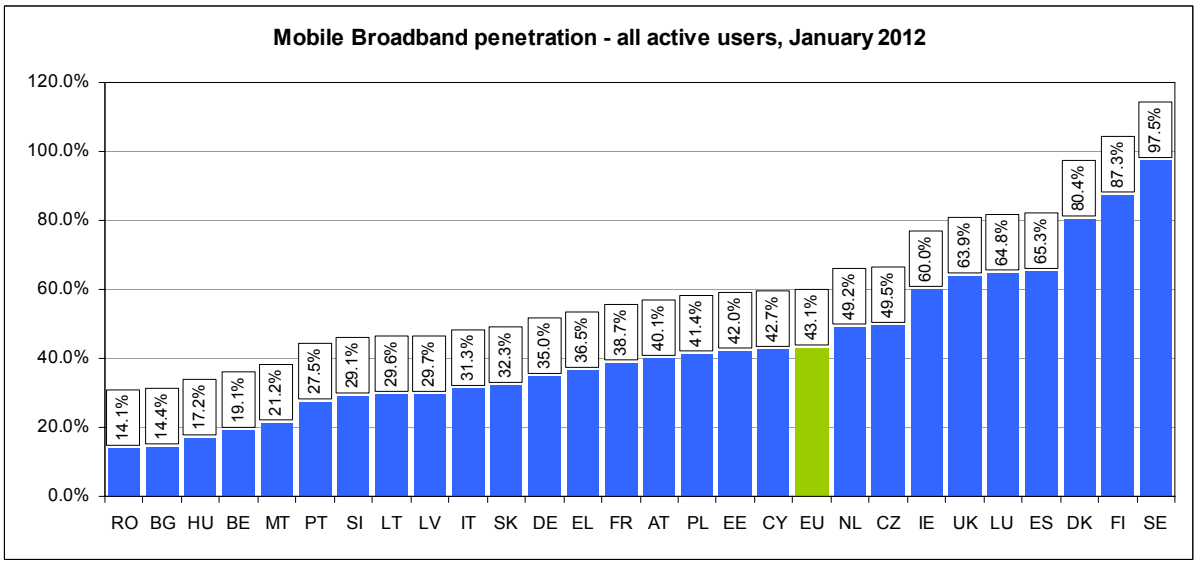


Source: Communications Committee

2.2.4. Fixed and mobile broadband

The boost of mobile broadband, including both datacards and smartphones, was very important in 2011; data through wireless devices is growing exponentially. The penetration rate for all active subscribers jumped from 26.2% in 2011 to 43.1% in 2012 (i.e. a 17 percentage point year-on-year increase). (Figure 52)

Figure 52

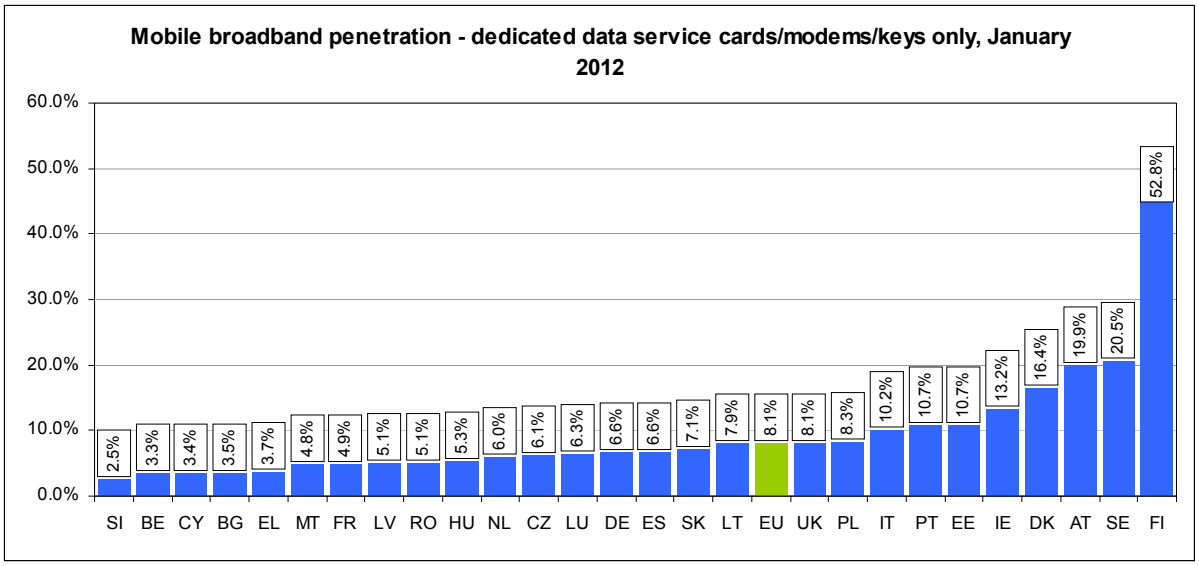


Source: Communications Committee

However, this increase was mainly due to a steep increase in the number of people using the internet through smartphones; the penetration level of datacards (laptop devices) only increased from 7.1% in 2011 to 8.1% in 2012 (Figure 53). Therefore, mobile broadband

growth was driven mainly by demand for handheld devices (smartphones or tablets) rather than by fixed wireless access based on laptops.

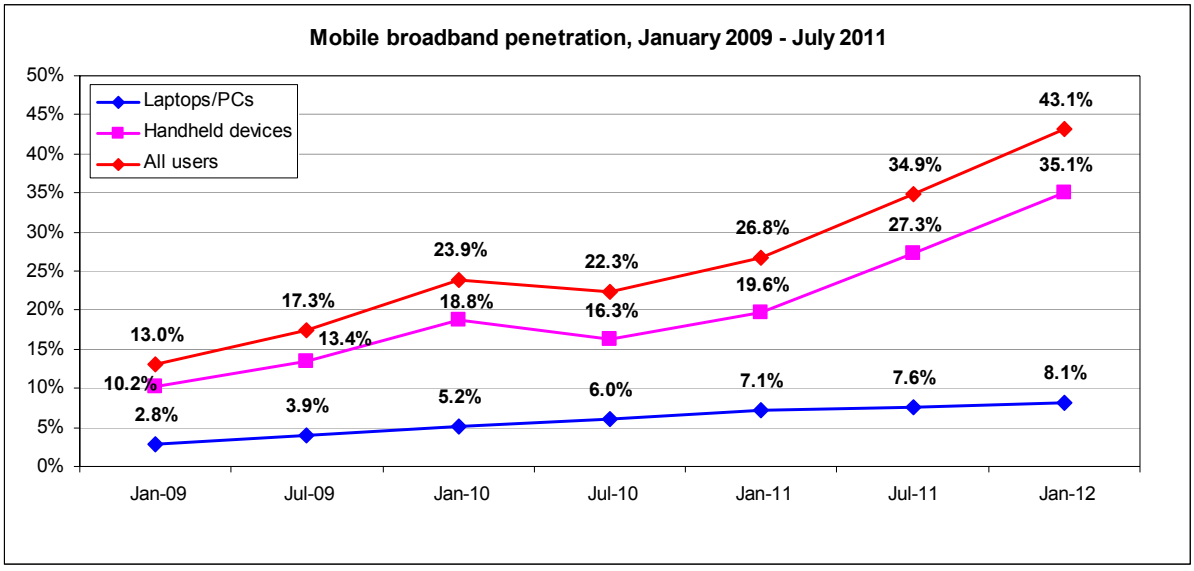
Figure 53



Source: Communications Committee

As the internet features on smartphones are so far limited (offers are usually price metered and quality is limited for some applications and services due to lower speeds and the smaller size of the screen), it is more logical that these are at present used more as a complement to fixed broadband than as a substitute. However, the rapid introduction of tablets and improved smartphones (Figure 54) in terms of processing power, capacity (fourth generation mobile speeds) and screen size may indicate that there will be a change in the way mobile broadband is used and in the future stronger substitution effects might appear.

Figure 54

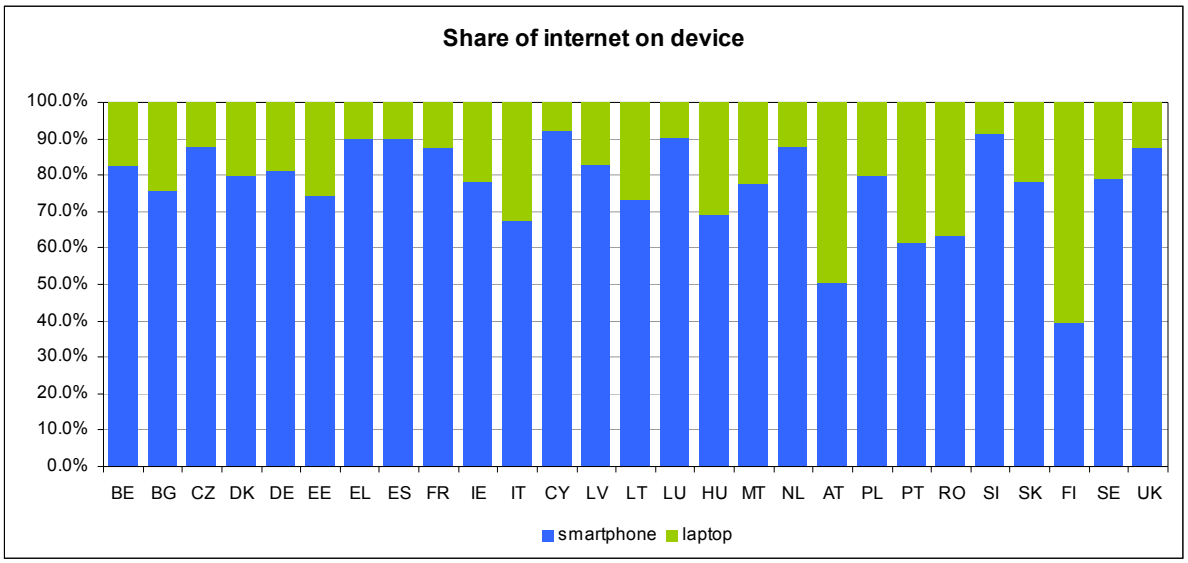


Source: Communications Committee

For example, Finland and Austria have a big share of mobile internet through laptops compared to other countries which might reflect a greater substitutability between mobile and

fixed broadband. In countries such as the Netherlands, Greece, Spain, Cyprus or Slovenia most of the mobile broadband lines are sustained on smartphone devices (i.e. there is a greater degree of complementarity). (Figure 55)

Figure 55



Source: Communications Committee

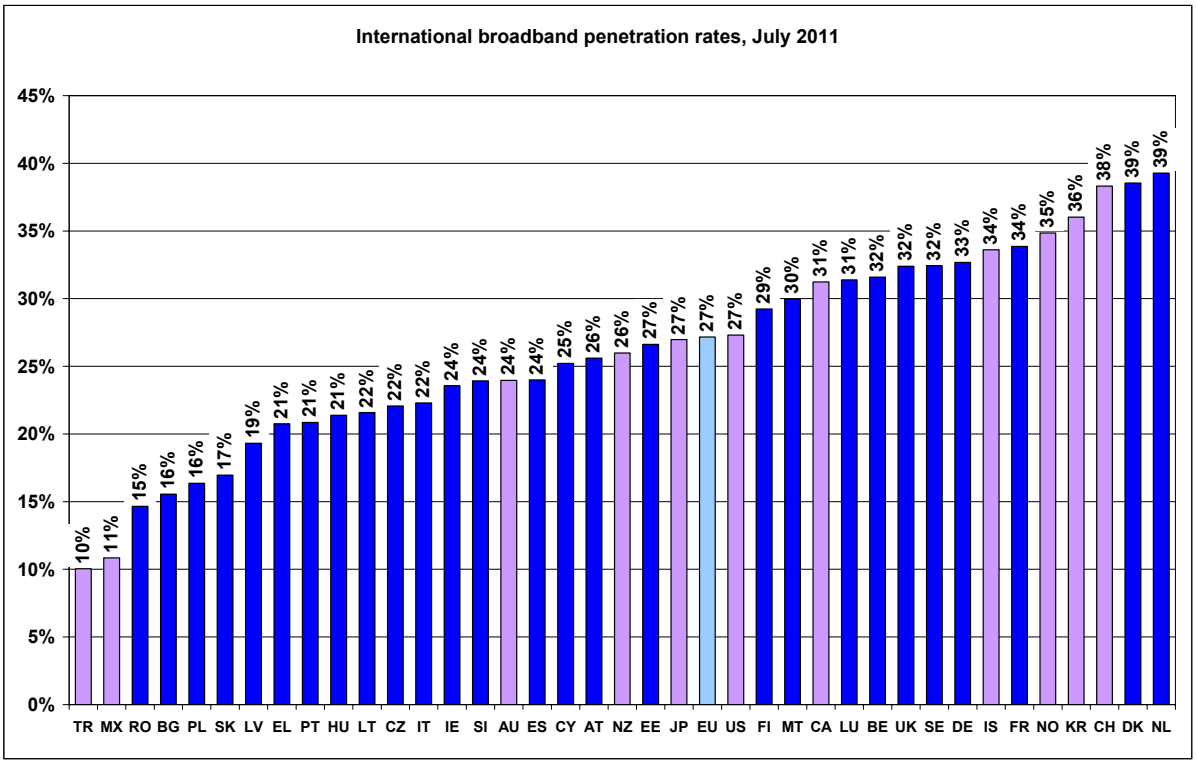
Combining fixed and mobile broadband by businesses is now common place in Europe. In 2011, more than nine out of 10 enterprises in the EU27 had access to and used the internet. More than eight out of 10 accessed and used the internet through a fixed broadband connection and almost half via a mobile broadband connection. While the percentage of enterprises having internet access and using a fixed broadband internet connection in January 2011 was, on average, high in the EU27 (95% and 87% respectively) and increased marginally compared to January 2010 (+1 percentage point, +2 percentage points respectively), the share of enterprises that used mobile broadband internet connections (47%) increased sharply by 20 percentage points, in particular among medium-sized enterprises (+23 percentage points).

However, the share of enterprises using a mobile broadband connection varied widely from country to country from 15% in Romania to 77% in Finland and 67% in Sweden. Of the large enterprises, more than 90% in Austria, Finland, Sweden, Germany, France and the United Kingdom used mobile broadband Internet connections.

2.2.5. An international comparison

The EU penetration rate surged in 2011 and for the first time overtook Japan (by 0.2 percentage points) and was only 0.5 percentage points behind the United States; in 2010 Europe lagged behind these two countries by 1.4 percentage points and 0.7 percentage points respectively. In fact, between July 2010 and July 2011, the EU increased its penetration rate by 2.1 percentage points while, in the same period, the United States and Japan only increased their penetration rates by 0.3 percentage points and 0.6 percentage points respectively (Figure 56). On a global level, the Netherlands and Denmark continued to be the first countries in the ranking.

Figure 56: International broadband penetration rates, percentage of population



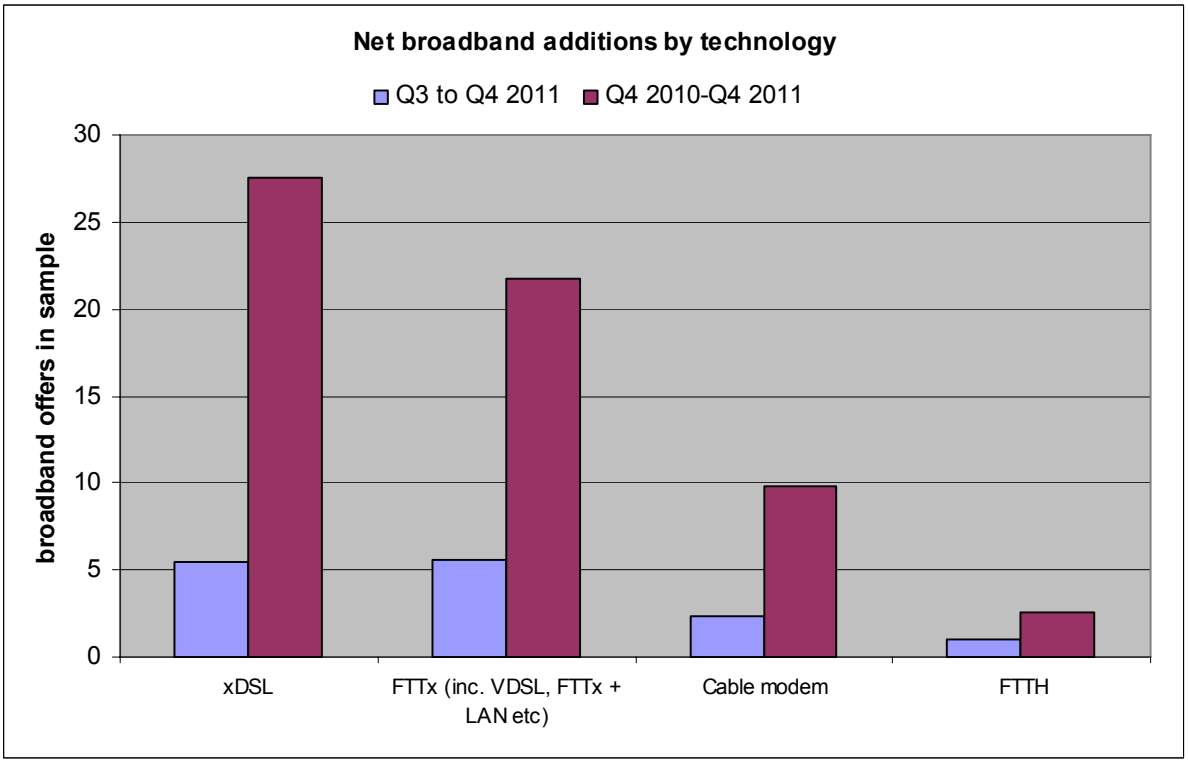
Source: Commission services based on COCOM and OECD figures

2.2.6. Broadband technologies and speeds

DSL continues to be the predominant technology in the EU broadband market despite the decrease in its share from 80.9% of all fixed broadband lines in January 2006 to 75.9% in January 2012 (Figure 58). In absolute terms, the number of xDSL lines increased but as the overall market grew faster, the share of DSL lines fell. The loss of market share in 2011 by lines using xDSL technologies, including VDSL, has become more moderate (-1.1%) with respect to the previous year. Most of the gains have gone to lines based on cable modems (+0.6 percentage points), with other technologies just gaining a mere 0.5 percentage point.

However, the noticeable development was the loss of market share of xDSL lines that occurred in the second half of 2011 (-0.7 percentage points) when, according to the data, almost the same number of lines using technologies other than xDSL were sold (Figure 59). Considering that VDSL lines are yet a fraction of the DSL market (around 1.5% according to COCOM data), this is a very significant development as it shows that the substitution of first generation broadband access accelerated at the end of 2011. This change mirrors developments in other regions of the world; altogether, in the last quarter of 2011 the number of net additions of lines based on FTTX, FTTH, and upgraded cable-modem clearly exceeded growth of DSL based lines (Figure 57).

Figure 57

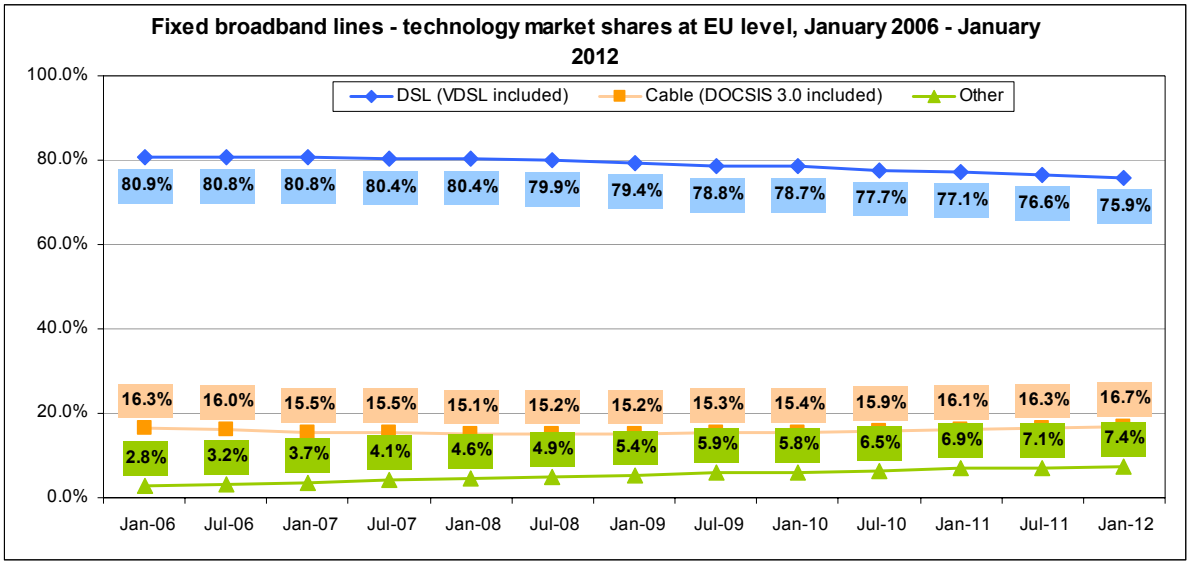


Source: Point Topic

Growth of fixed broadband based on cable and other non-DLS technologies with respect to xDSL technologies was significant in Cyprus (4.3 percentage points), Lithuania (4.1 percentage points), Latvia (3.8 percentage points), Ireland (3.7 percentage points) and Portugal to a lesser extent (2.9 percentage points).

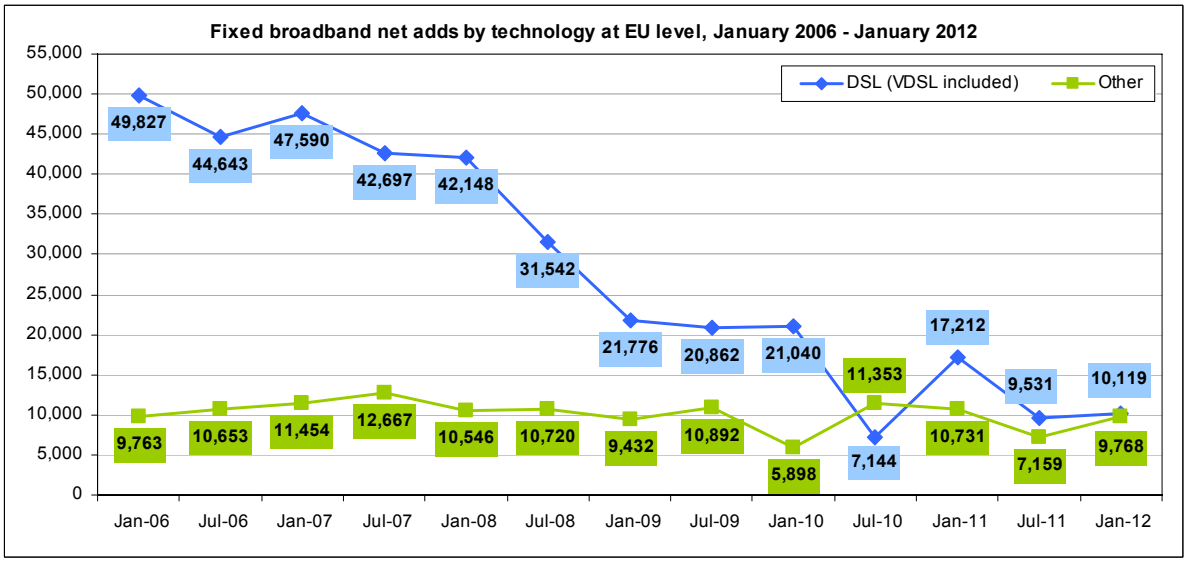
The growth of alternative technologies also brought an increase in nominal speeds from 5.1% of all fixed broadband lines providing download speeds equal to or higher than 30 Mbps in January 2011 to 8.5% a year later. Significantly, the proportion of broadband access lines that can be qualified as NGA, because they are based on fibre infrastructure and can be easily upgraded to provide speeds of 30 Mbps and beyond, already represents 12% of all broadband lines.

Figure 58: Fixed broadband lines in the EU by technology



Source: Communications Committee

Figure 59



Source: Communications Committee

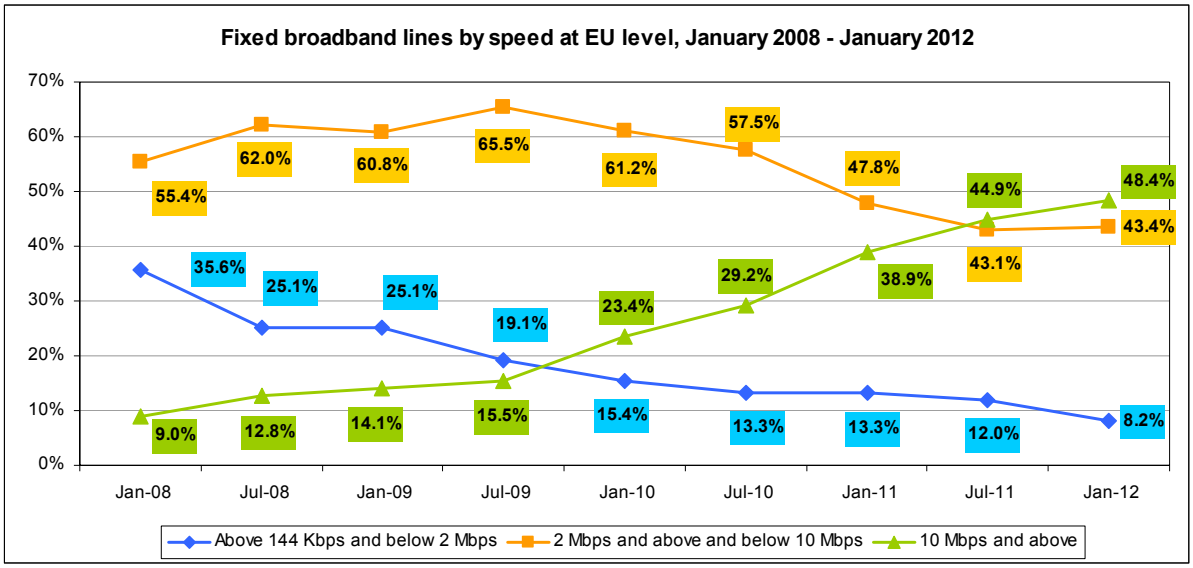
DSL technologies still dominate the EU market and current broadband speeds remain far below the targets set by the DAE. However, lines providing speeds of 10 Mbps and above increased by 9.5 percentage points year-on-year, representing 48.4% of the total market in January 2012 (Figure 60). The proportion of intermediate speeds (above 2Mbps and below 10Mbps), which accounted for the largest share of lines in 2011 (47.8% out of the total), fell to 43.4% in 2012. The range of speeds below 2 Mbps continued falling and represented only 8.2% of the total broadband market in 2012.

Evidence on the importance of faster speeds starts to emerge. A recent survey on firms' perceptions of the importance of speeds[55] shows the existence of significant fragmentation of

[55] Enhancing the business value of broadband, INSEAD, 2012

speeds across the same businesses with branches in different locations. While higher speeds are considered to have had a significant impact on the internal organisation of work, low speeds are seen as the main barriers to the use of crucial business applications such as cloud computing.

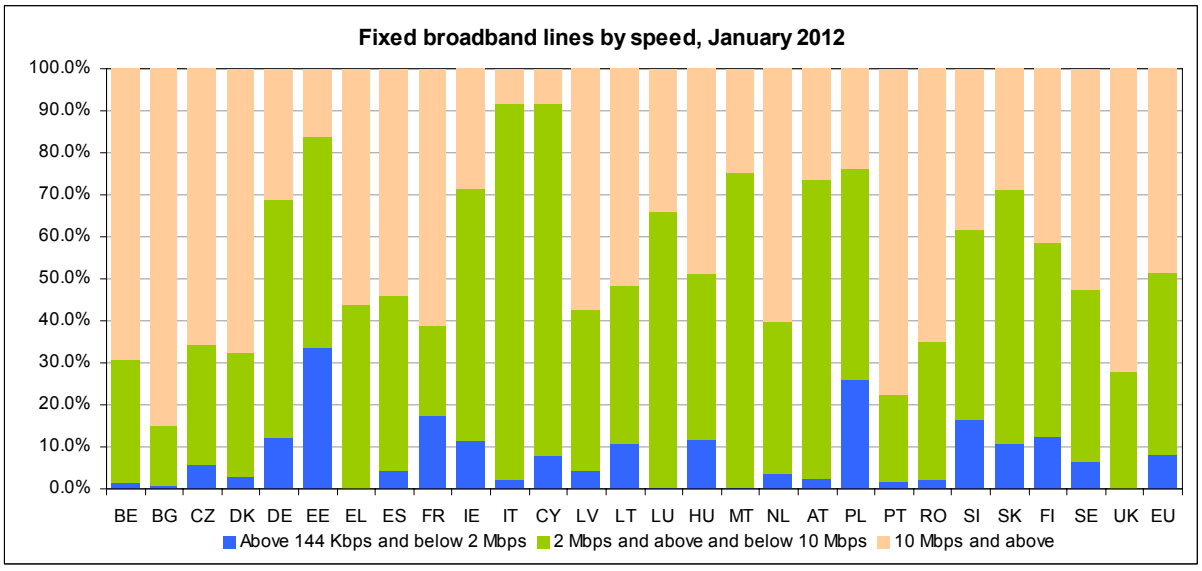
Figure 60: Fixed broadband lines by speeds, 2008-2012



Source: Communications Committee

More than 75% of fixed lines in Bulgaria and Portugal provide speeds above 10 Mbps. The United Kingdom, Belgium and Denmark follow with around 70%. Romania, the Czech Republic, France, the Netherlands and Latvia have a share of around 60% (Figure 61).

Figure 61: Fixed broadband lines in the EU Member States by speed

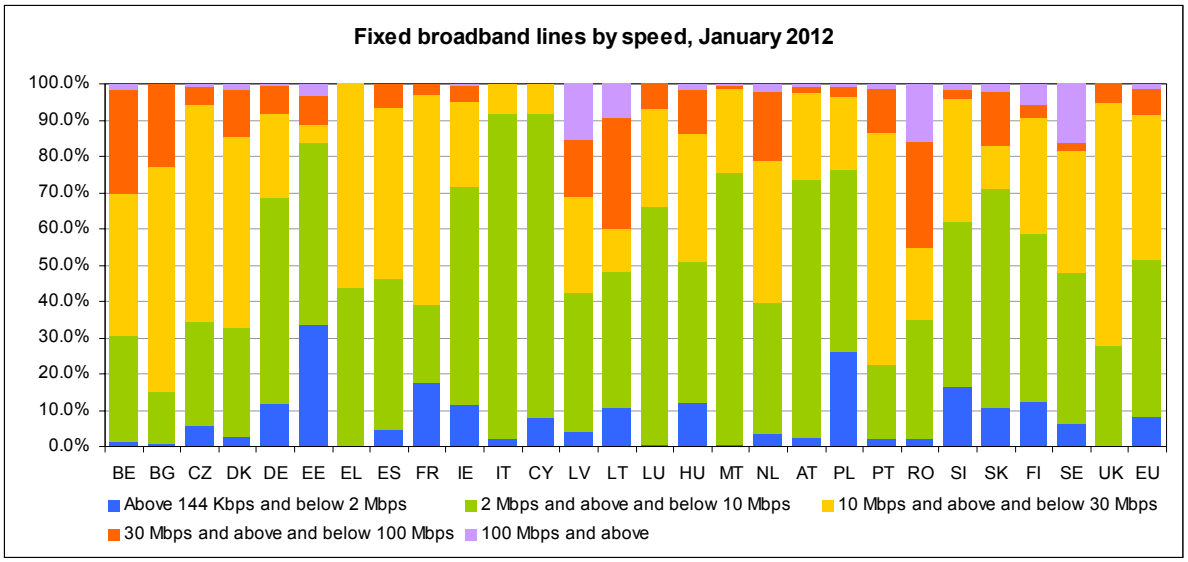


Source: Communications Committee

While there is a clear trend towards delivering higher speeds using first generation broadband technologies, only 8.1% of the population in the EU subscribes to lines providing speeds equal to or higher than 30 Mbps. Most of these lines are for speeds above 30Mbps and below 100 Mbps with just 1.3% of accesses in some EU countries providing speeds equal to or

above 100 Mbps (Figure 62). Lack of demand for NGAs by consumers who claim there is no need for faster access appears to be one of the main reasons for this low uptake level[56].

Figure 62: Fixed broadband lines in the EU Member States by speed

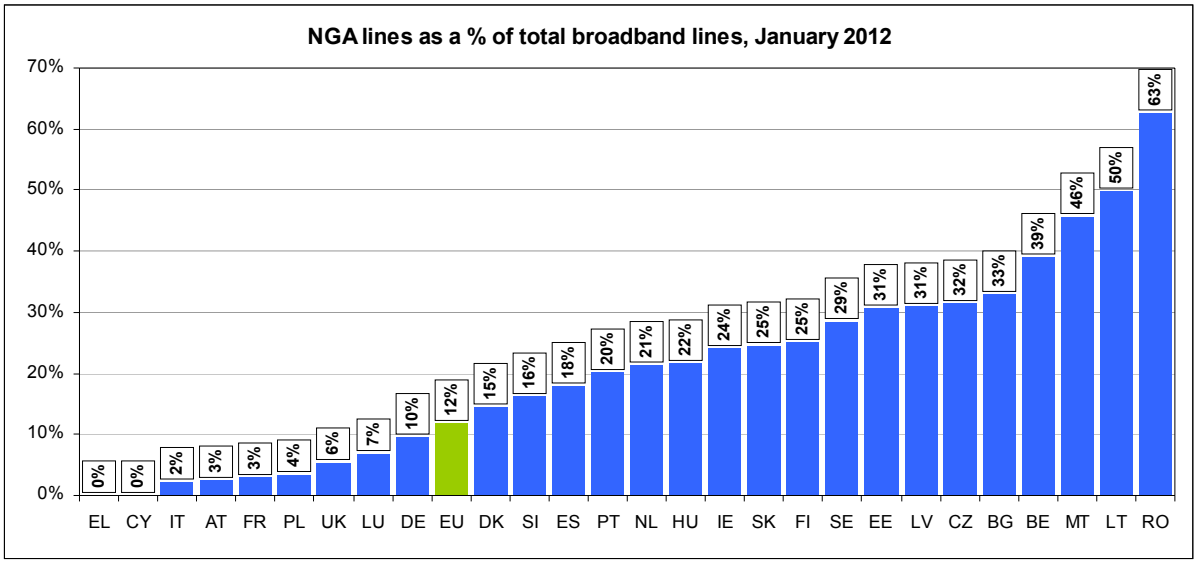


Source: Communications Committee

In 2011, only 12% of all fixed lines in the EU (Figure 63) were NGAs, i.e. were based on fibre technologies allowing the provision of ultra-fast download speeds (VDSL, Fibre to the Home, Fibre to the Building, + Ethernet/LAN, cable modem) even if actual speeds were in some cases lower than 30 Mbps. The deployment and take-up of NGAs across the EU is very heterogeneous and depends on a number of factors, including the competitive framework, the existing infrastructures and socio-economic factors which are particular to each EU country. For instance, Romania, despite being the country with the lowest fixed broadband penetration rate, is the country with the highest relative number of broadband lines with speeds above 30 Mbps. Similarly, Lithuania has the highest rate of take-up of FTTH and FTTB by households, according to the FTTH Council (Figure 64), even though the fixed broadband penetration rate is well below the EU average. Bulgaria is in a similar situation. But many of these FTTH/FTTB connections do not yet provide very fast speeds. Conversely, countries such as Denmark or the Netherlands are only average in terms of the take-up of very high-speed access lines while they have the highest penetration levels.

[56] The European Commission is running a consumer market study on the functioning of the market for Internet access and provision from a consumer perspective in the EU. Amongst other issues that will be looked at is the extent to which the service provided meets consumers' needs and expectations. In particular, whether the download speed of the Internet connection matches the contract conditions of consumers and the extent to which a slower speed of internet connection constitutes an important factor for switching provider.

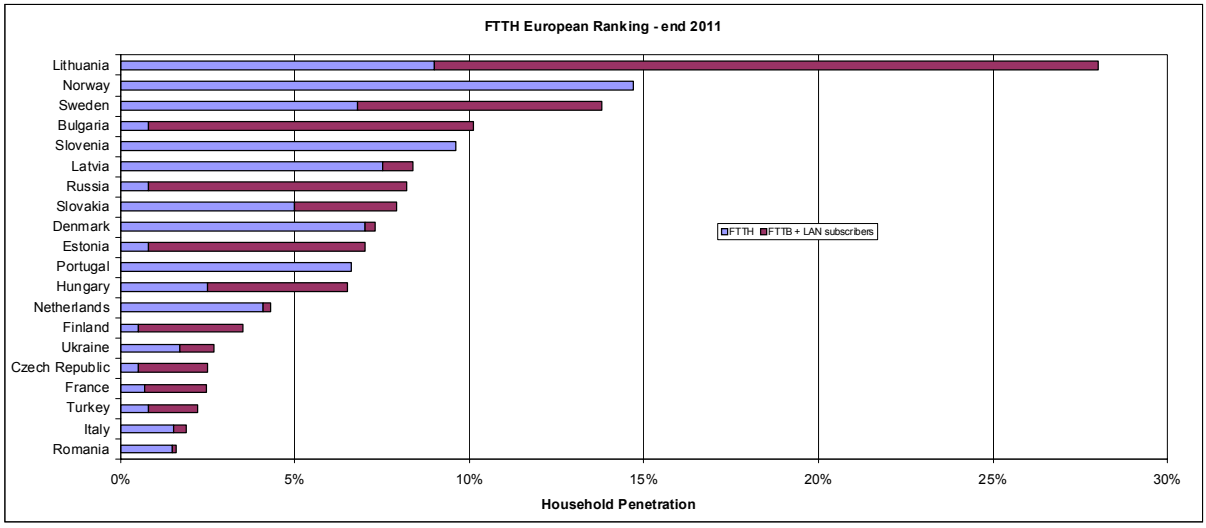
Figure 63: Take-up of NGAs



Source: Communications Committee

The Commission is agnostic about the technology used to reach fast and ultra-fast broadband. So far NGAs take-up accounts for 12% of the total broadband market although only 8.1% of clients are subscribing to speeds above 30Mbps. Therefore, some subscribers stay on products with speeds lower than 30Mbps despite their broadband access being supplied through next generation access networks. This gap between the levels of high speed adoption and the availability of NGAs reflects a lack of incentives by consumers to upgrade to faster service tiers. In some cases, carriers upgrade their clients' contracts for free but in other cases they split their offers so as to charge different prices depending on the speed provided. The fact is that some customers (around 25% of NGAs users) are not interested in fast broadband despite having potential access.

Figure 64



Source: FTTH Council Europe

As regards the evolution of coverage and take-up to meet the DAE in 2020, an estimated[57] penetration rate of 96% on an average speed of 30Mbps is expected while the equivalent figure for 100Mbps broadband is around 60%. Countries with either high population density and/or high current coverage are likely to be the countries that will more easily meet the DAE targets.

2.2.7. The NGA Demand Gap

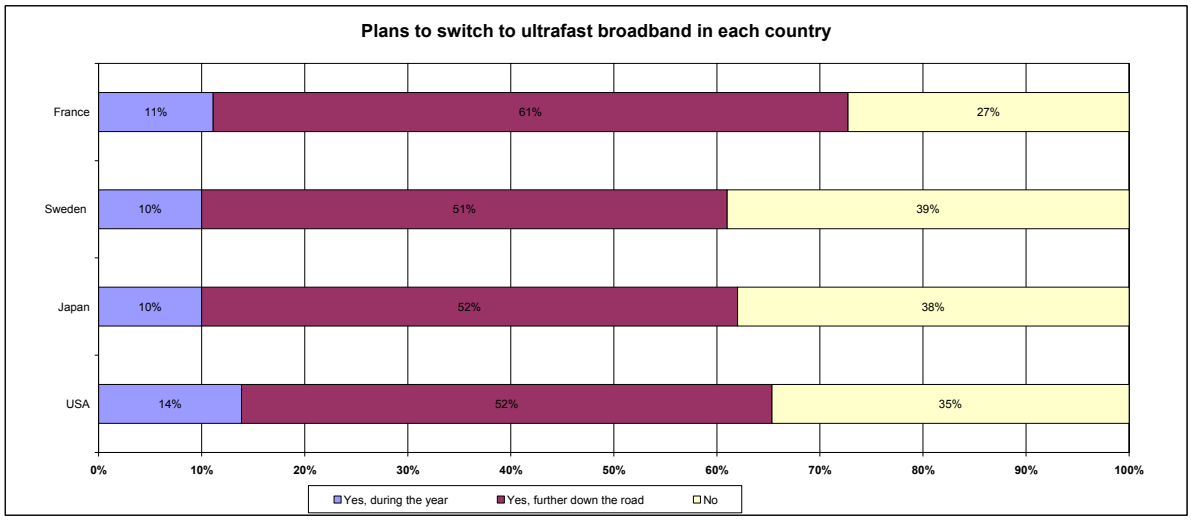
Although NGA rollout has accelerated since last year to reach 34% of Europeans, only 2% of them actually take up fast speed connections. It takes time for consumers to realise the benefits of faster speeds and be ready to pay a premium for it. In France, for example, differences in consumption levels between ultra-fast and slower broadband concern mainly viewing HD content, remote applications, video calling and downloading films. In Sweden, differences concern Tweeting, VOD and chat rooms. In Japan, they relate to accessing remote applications and network gaming. In the United States, gaps are primarily in the realm of TV and video consumption[58]. Moreover, US users of ultra-fast broadband are much more frequent users than others and a significant number switched to the use of new applications as speeds increased. In the other countries, users reported heavier consumption of services and applications they already used.

Ultra-fast broadband services are generally regarded as improving customers' satisfaction of their broadband experience. Drivers are mainly related to TV/video service consumption and simultaneous usage of a household. Main barriers are related to pricing and lack of availability. Despite obstacles, 10% of households polled in France and Sweden plan to switch to ultra-fast broadband within a year and over 50% in the long run (Figure 65).

Pricing is identified as the prime obstacle to take-up. In some of the surveyed countries, differences in prices are not particularly strong, hence a lack of information and appropriate marketing may still be an issue. A recent Eurobarometer survey[59] carried out on behalf of the European Commission addressed European consumers' willingness to pay for ultra-fast broadband and found that 82% of EU citizens were not willing to pay more for a faster internet connection than their current one. The three main reasons for not switching to ultra-fast broadband were a lack of awareness of the potential benefits, lack of services and expected prices. Content upload and sharing (39%), online videos (32%) and TV watching (27%) were the main drivers for the EU population to pay more for their internet connection.

[57] Source: Analysys Mason, "The socio-economic impact of bandwidth", forthcoming
[58] Idate, "Ultra-fast broadband survey", October 2011.
[59] Available at
http://ec.europa.eu/information_society/digital-agenda/scoreboard/pillars/singlemarket/index_en.htm

Figure 65: Plans to switch to ultra-fast broadband in each country

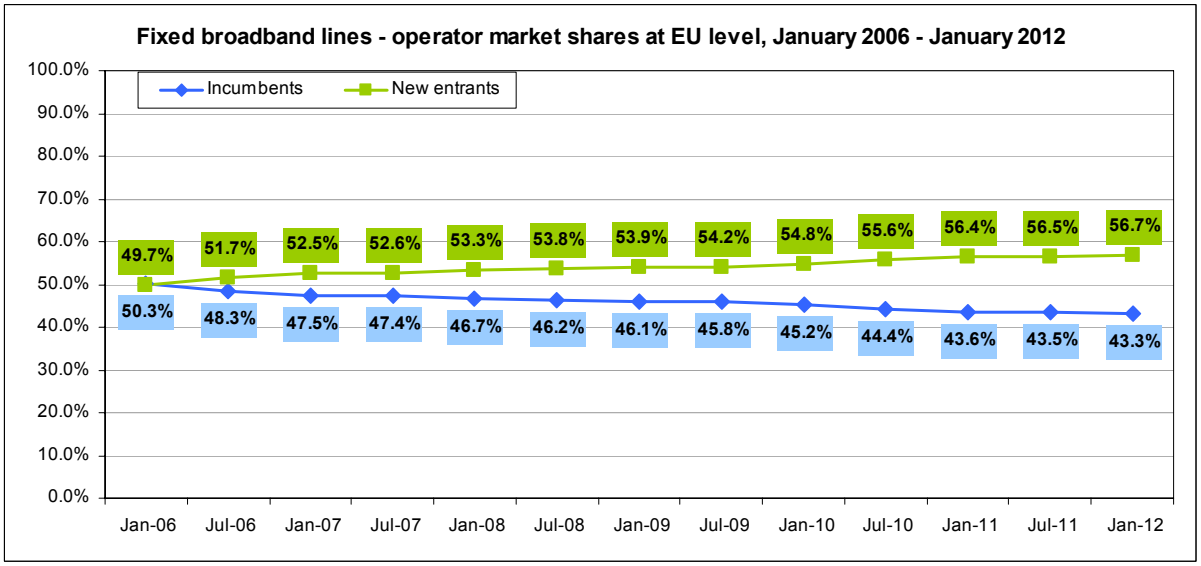


Source: IDATE - Ultra-fast broadband consumer market survey 2011 Base: Non-ultra-fast BB internet households

2.2.8. Competition dynamics

The market share[60] of the incumbent fixed operators has followed a downward trend in the period from July 2003 to July 2011. In January 2012, this trend continued and at the EU level, new entrant operators managed to regain some market positions. (Figure 66).

Figure 66: Percentage of broadband lines by operator



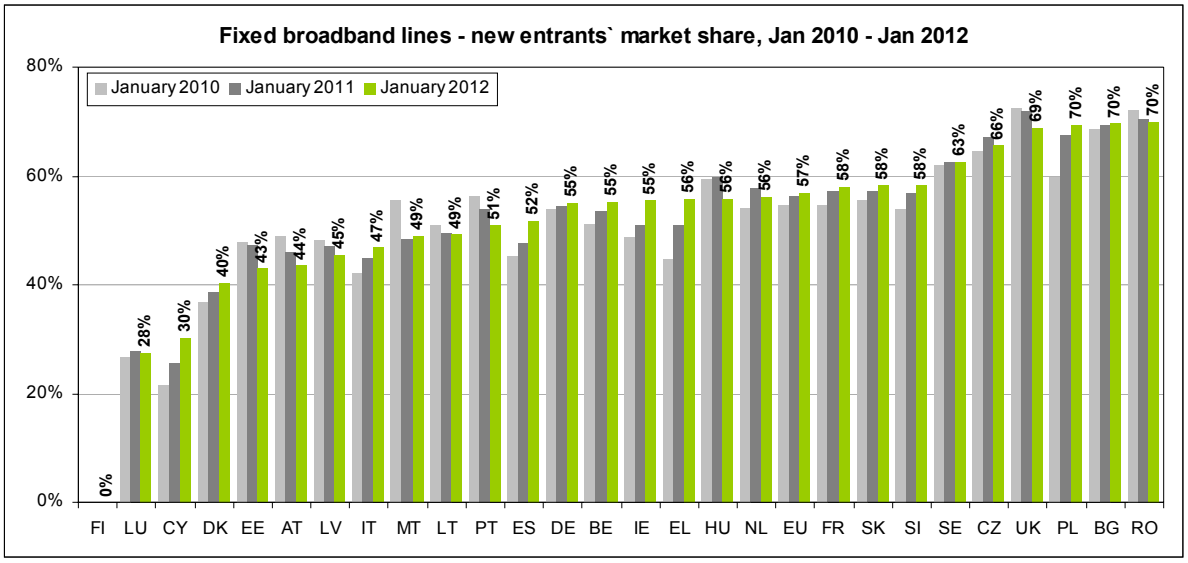
Source: Communications Committee

New entrants' market share in January 2012 increased by 0.4 percentage points from the previous year and now stands at 56.7% of the total broadband market. However, incumbent operators increased their market share with respect to January 2011 in a large group of countries: Estonia (4.3 percentage points), Hungary (3.9 percentage points), Portugal (3 percentage points), the UK (2.9 percentage points), Austria (2.4 percentage points) and the

[60]Based on accesses

Netherlands, Latvia and the Czech Republic (around 1.7% percentage points each). New entrants made significant gains in Greece (4.7 percentage points), Cyprus and Ireland (4.6 percentage points) and Spain (4 percentage points), where the incumbent has for the first time lost its market leadership (Figure 67).

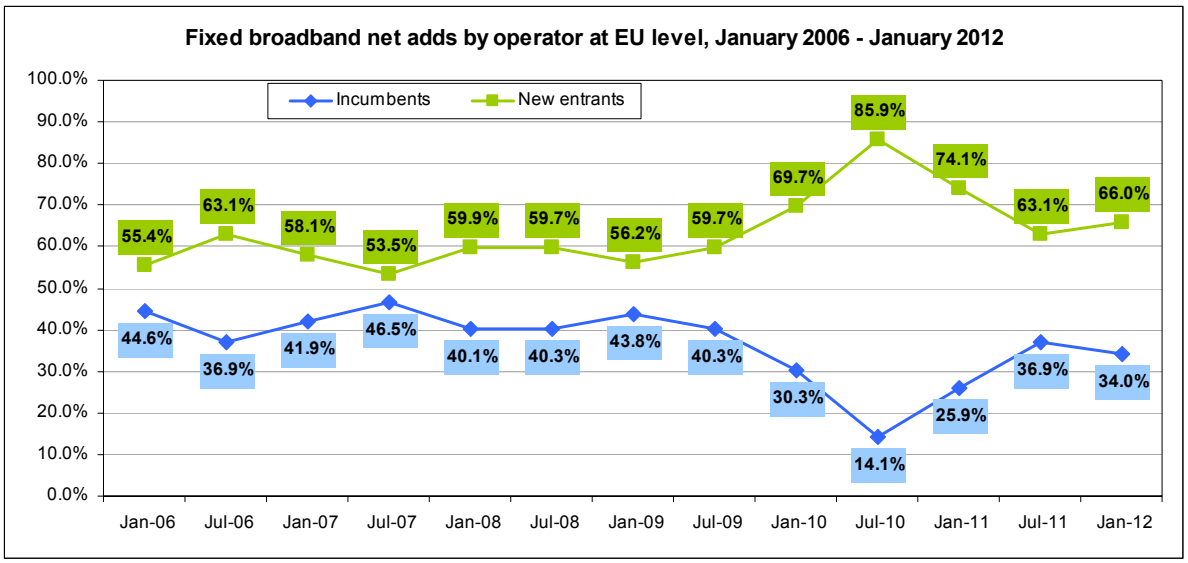
Figure 67: Fixed broadband lines – New entrant's market share, 2010-2012



Source: Communications Committee

The share of new lines in favour of new entrant operators is still above that of incumbent operators. In the EU, 66% of market growth was due to new entrants whereas incumbents contributed to 34% of new broadband lines. Therefore, new entrant operators sold two thirds of all the new fixed lines in January 2012. However, new entrants decelerated their net adds amounted to 8.1 percentage points with respect to the previous year (Figure 68).

Figure 68: Fixed broadband net adds by operator in the EU

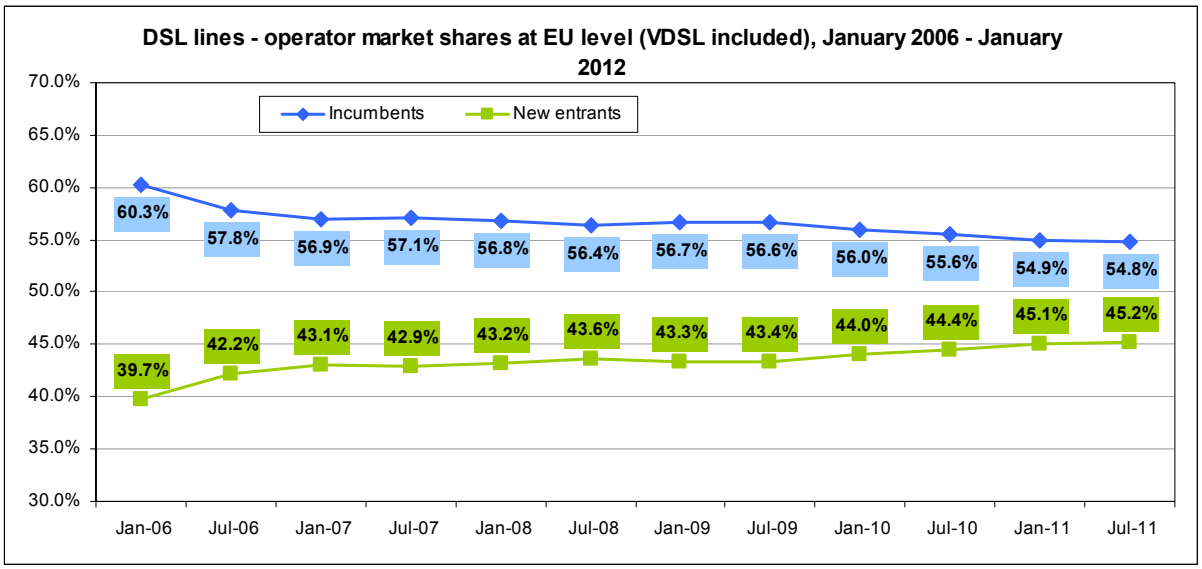


Source: Communications Committee

Regarding the DSL market, incumbents continued their negative trend and lost more market share than in previous years with a net 0.8 percentage point loss to 54.8% (Figure 69). It

seems that DSL incumbent lines and those from unbundlers are converging. Nonetheless, the trends are smooth since the DSL market is already competitive and incumbents are cutting off prices to keep their market share.

Figure 69: DSL lines – Market shares at EU level, 2006-2011

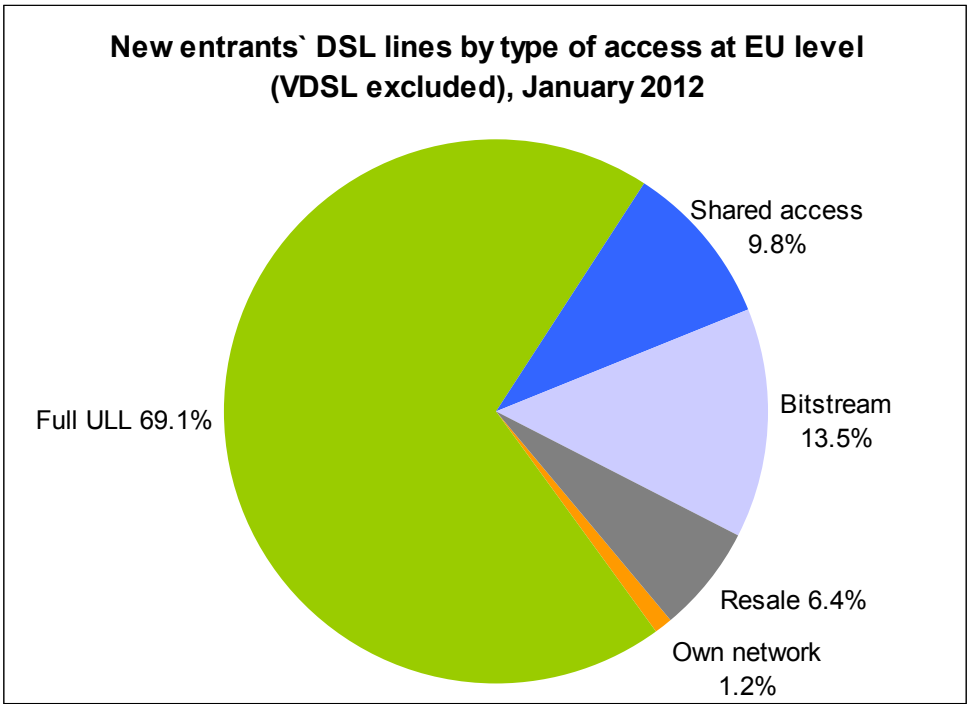


Source: Communications Committee

New entrants are using local loop unbundling (fully unbundled lines and shared access) as the main option to access the incumbent network. Full LLU access increased by 12.3 percentage points in 2012. A transfer is taking place from other types of accesses to full LLU and in this way, shared access decreased by 2.6 percentage points and bitstream and resale accesses also declined (by 1.3 percentage points and 1.6 percentage points respectively).

All in all, LLU accounts for 78.9% of total DSL accesses and is by far the most used wholesale access. Bitstream/resale access accounts for 19.9% and DSL lines provided by new entrants with their own network account for only 1.2% of the total (the same percentage as in January 2011) (Figure 70).

Figure 70: New entrants' DSL lines by type of access



Source: Communications Committee

Fully unbundled lines are the preferred way for new entrants to provide access in sixteen countries (Greece, Cyprus, Austria, Portugal, Finland, Sweden, Germany, France, Spain, Italy, Romania, Netherlands, Slovenia, Luxembourg, Denmark and the UK). In Bulgaria, Lithuania, Hungary, Ireland and the Czech Republic, bitstream dominates. Latvia and Belgium have a preference for resale.

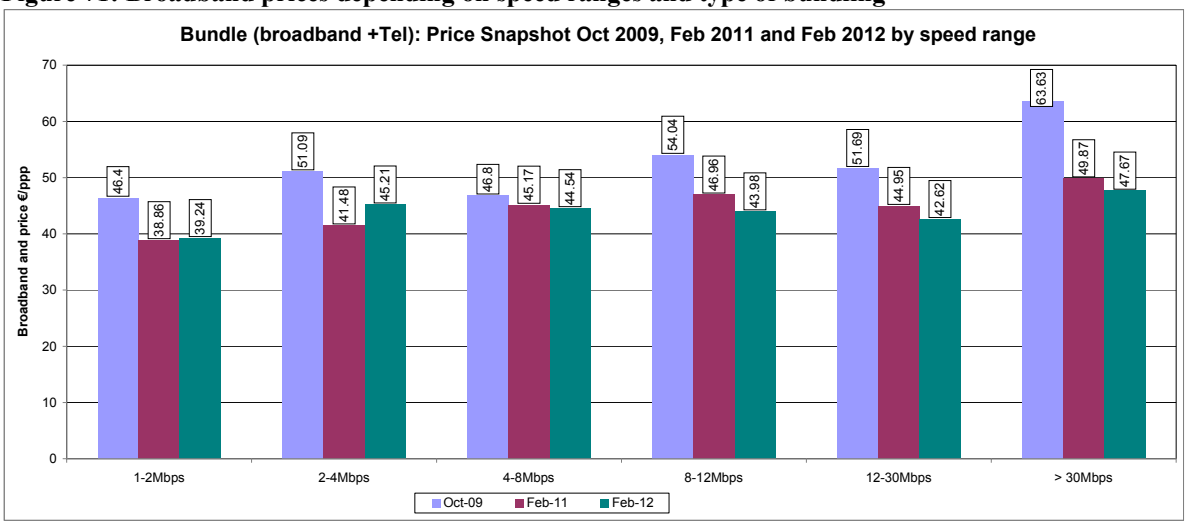
2.2.9. Prices

To analyse trends in broadband retail prices, it is necessary to split available offers according to speed brackets and bundling solutions (stand alone internet; internet + telephone; internet + television) and then look at the evolution in prices. Median prices are used to compare the price levels in 2009 to 2012 (Figure 71).

The broadband prices refer to a snapshot in years 2009 and 2012. The sample includes around 3,700 commercial offers[61] and reveals a pattern of price reduction over the last three years for bundled offers (broadband + telephony or broadband + telephony + TV). Price competition is mainly taking place in the broadband segment with speeds above 4 Mbps. Price evolutions for the triple play offers are a bit clearer.

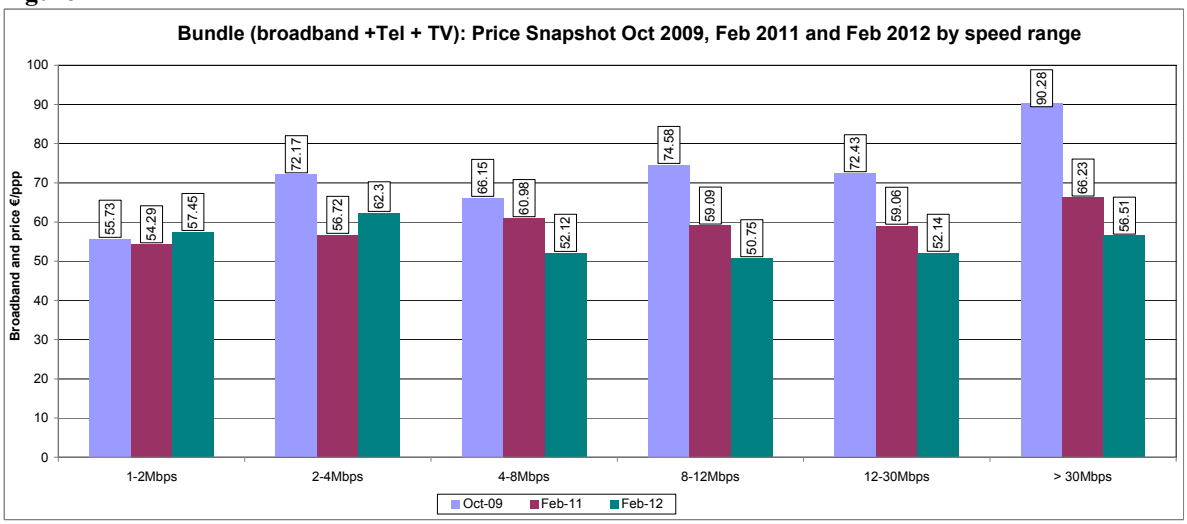
[61] Broadband Internet Access Cost (BIAC). Report August, 2011. Van Dijk-Management Consultants

Figure 71: Broadband prices depending on speed ranges and type of bundling



Source: Broadband Internet Access Cost (BIAC) Report 2012 (forthcoming). Van Dijk-Management Consultants

Figure 72

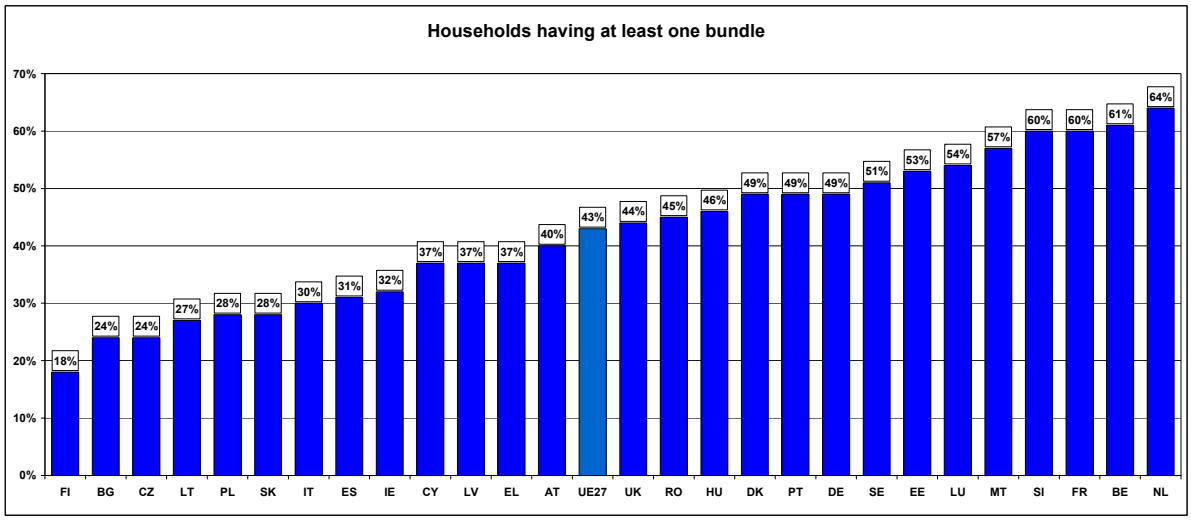


Source: Broadband Internet Access Cost (BIAC). Report August, 2011. Van Dijk-Management Consultants

According to a Eurobarometer survey, the use of service packages continues to grow across the EU with 43% of households now obtaining their communication services through a package (up from 29% four years ago). Most packages include internet access (90%) and a fixed telephone (81%). The inclusion of television channels is less popular (48%) and a mobile telephone in the package is the least common item (19%). Most users have never considered switching bundle provider (60%).

Bundled service packages are the prevailing way for consumers to get electronic communications services in the Netherlands, Belgium, France, Slovenia, Malta, Luxembourg, Estonia and Sweden (Figure 73**Error! Reference source not found.Error! Reference source not found.**).

Figure 73 Percentage of households subscribing to bundled products



Source: Eurobarometer, E-Communications Household Survey, Autumn 2011

2.3. Developments in mobile communications

- Total revenues of the EU mobile sector decreased by 0.8% in 2011.
- Nevertheless, data revenues increased by 22.6% in Q3 2011 compared to Q3 2010 in the five largest Western European markets.
- Europe remained the region with the highest mobile subscription penetration at 127%. Penetration increased by 4.3 percentage points in 2011. Machine-to-Machine SIM cards represented 4.1% of total subscriptions in the EU. Fifty percent of subscriptions were postpaid.
- Market leaders' and main competitors' (second largest operators in national markets) market shares have slightly decreased. Mobile Virtual Network Operators (MVNOs) have 4.1% of subscriptions.
- Average Revenue per User declined by 9% in 2010. Average Revenue per Minute stood at EUR 0.11 in 2010.
- Mobile broadband coverage (HSPA) reached 85% in 2010. LTE is already available in eight EU Member States.
- Mobile broadband penetration (all active users) went up to 43% in January 2012 from 26.8% in January 2011.
- Mobile broadband traffic is already more than twice as high as voice traffic and is expected to grow exponentially in the coming years.

2.3.1. The mobile market

Total revenues of the EU mobile telecoms sector decreased by 0.8% in 2011. Voice telephony revenues declined by 4.7% while data revenues increased by 9.8%. Mobile data was the fastest growing segment of the telecoms services market. However, since data represented only 13.8% of mobile revenues, this could not compensate for the decline in mobile voice services[62].

Europe remained the region with the highest mobile subscription penetration at 127%. Penetration increased by 4.3 percentage points in 2011. Machine-to-Machine SIM cards represented 4.1% of total subscriptions in the EU and 50% of subscriptions were postpaid.

The mobile sector is a very competitive segment of the telecoms market. Market leaders' and main competitors' (second largest operators in national markets) market shares have slightly decreased in the EU mobile markets. At the same time, the mobile market remained highly concentrated with more than two thirds of subscribers belonging to the top two operators in many Member States. Mobile Virtual Network Operators had a market share of 4.1% in October 2011.

Mobile prices continued to go down. Average Revenue per User declined by 9% in 2010. Average Revenue per Minute stood at EUR 0.11 in 2010. Mobile communications became cheaper by 31-42% based on representative usage baskets between 2006 and 2010[63].

Mobile broadband is the primary focus area of mobile operators. Mobile broadband coverage (HSPA) reached 85% in 2010. Fourth generation mobile networks (LTE) are already available in eight EU Member States. Mobile broadband penetration (all active users) went up to 43.1% in January 2012 from 26.8% in January Penetration of dedicated devices increased more moderately from 7.1% to 8.1% in the last twelve months. Mobile broadband traffic is already more than twice as high as fixed traffic, and is expected to grow exponentially in the coming years[64].

2.3.2. Mobile subscriptions

Europe continued to be the region with the highest mobile SIM card penetration in the world. The penetration rate reached 127% in the EU (Figure 74) in 2011 as opposed to 110% in Australia (2009), 100% in Latin America (2011), 98% in South Korea (2009), 97% in North America (2011), 96% in the Middle East (2011), 88% in Japan (2009) and 69% in China (2011)[65].

Despite the already high penetration rate in the EU, mobile SIM cards grew by 21.6 million in 2011. The very high penetration rate is as a result of several factors: people may have separate subscriptions for business and private use or data and voice communications. In addition, due to the still large differences in roaming and domestic calls, those people spending substantial time in two different countries may have subscriptions in both countries. Furthermore, the

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[62] EITO (2011)

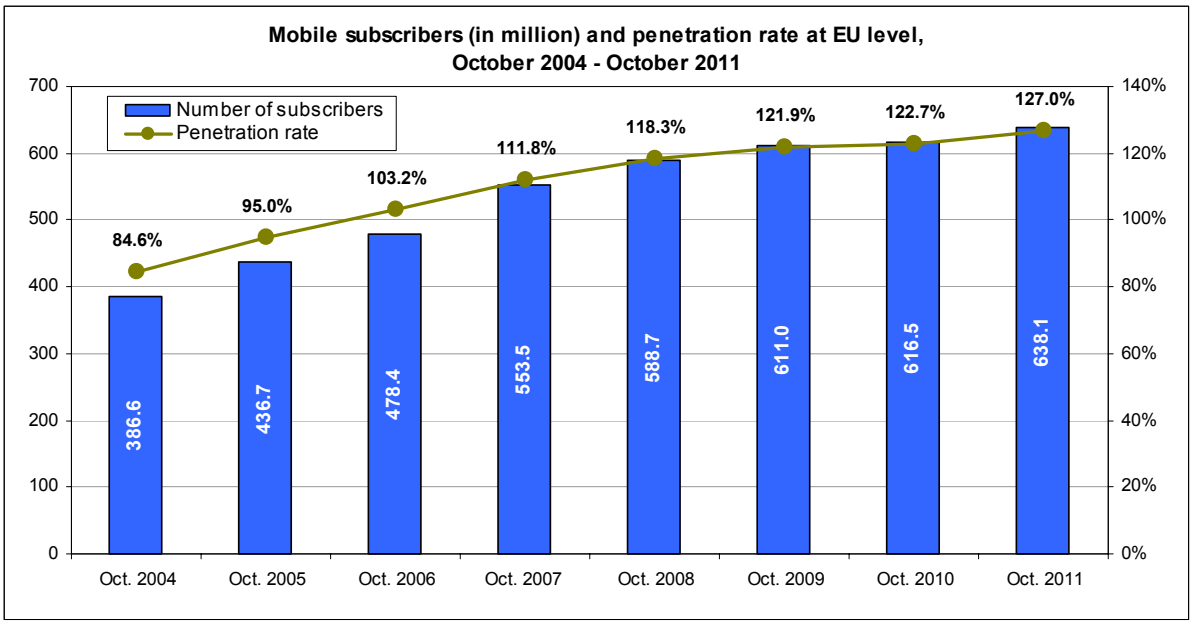
[63] Teligen (2011)

[64] Ericsson: Traffic and market data report (November 2011)

[65] Source: OECD Communications Outlook 2011 and Ericsson: Traffic and Market Data Report (November 2011). For some countries, the latest available figures are as of 2009. Mobile penetration stood at 121.9% in the EU in 2009.

growing number of SIM cards used for communication between objects (Machine-to Machine SIMs) is significant and partly responsible for the growth in penetration.

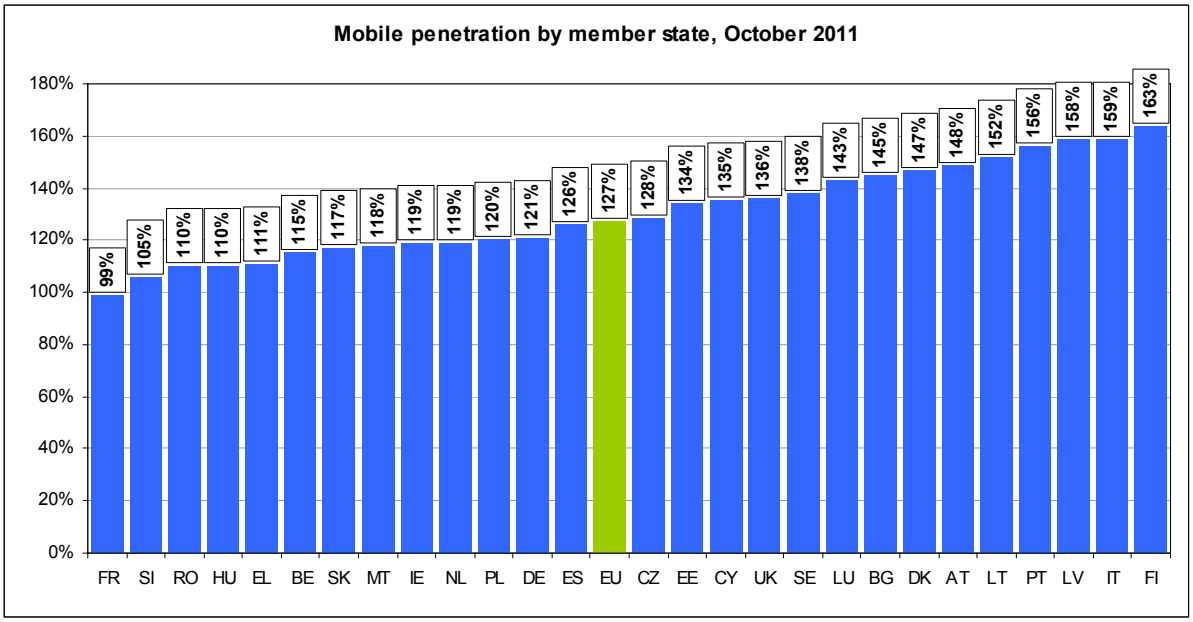
Figure 74: Mobile subscribers and penetration rate at EU level October 2004 – October 2011



Source: Commission services

There are large differences in penetration at Member State level (Figure 75). Latvia, Finland, Italy, Portugal and Lithuania are above 150% as opposed to France and Slovenia (below 110%). France is the only Member State with less than 100% due to the very high focus on postpaid subscriptions. The differences among Member States do not necessarily mean that in countries with lower penetration, mobile use is also lower. Differences rather reflect the different levels of multiple subscription use.

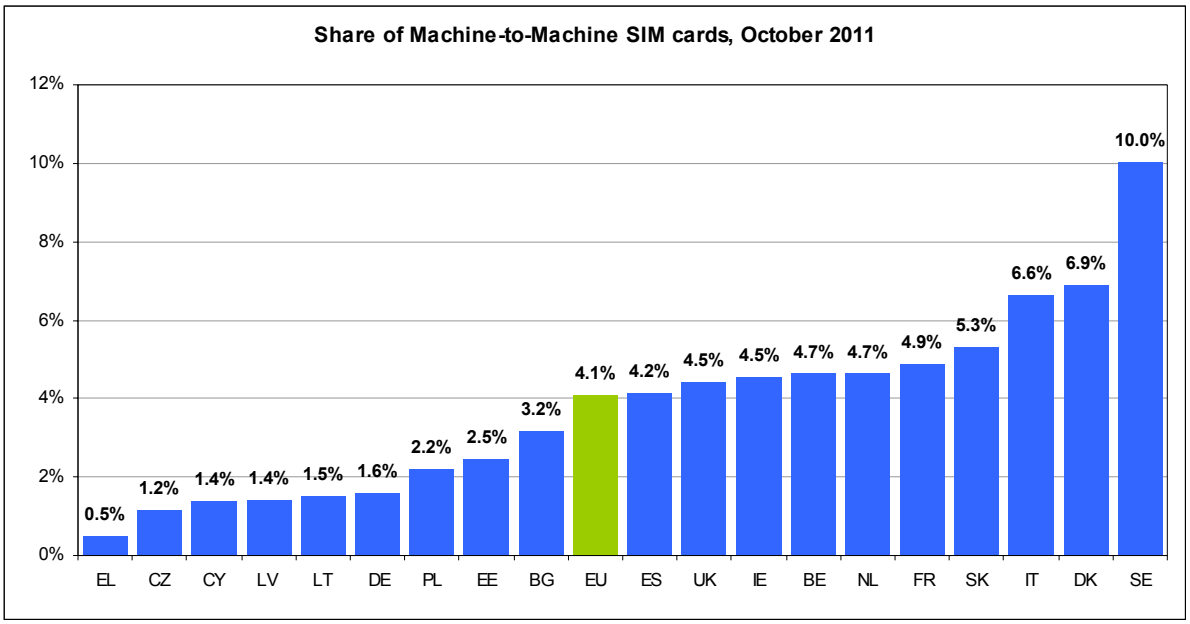
Figure 75: Mobile penetration by member state, October 2011



Source: Commission services

Starting this year, the Commission reports on the percentage of Machine-to-Machine SIM cards (Figure 76). Machine-to-Machine SIM cards are used in several industries through a large variety of devices to communicate between objects. M2M can be used in homes (e.g. alarm systems), smart grids, fleet management, health care and smart metering for example. Nineteen of the 27 Member States were able to provide data. There were 23 million M2M SIMs in those 19 countries, accounting for 4.1% of all SIM cards. Sweden has by far the highest figure with 10%. Recent analysis estimates that by 2020, there may be as many as 2.1 billion M2M SIMs worldwide[66] .

Figure 76: Share of Machine-to-Machine SIM cards, 2011

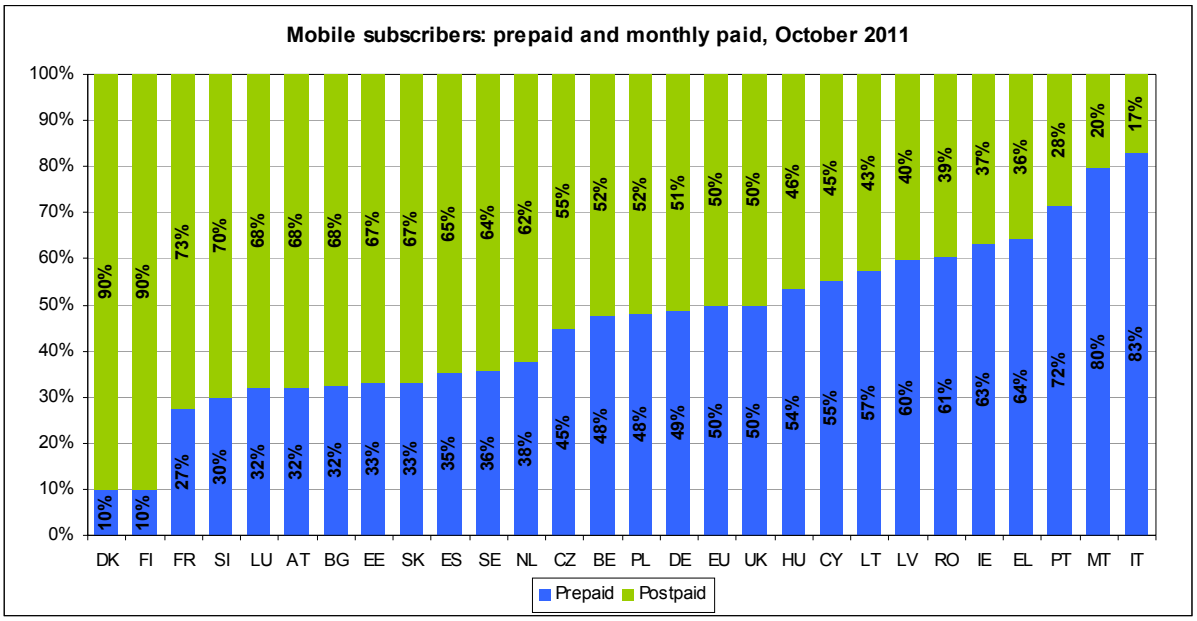


Source: Commission services. The figure for the EU represents an average of 19 Member States.

Half of EU mobile subscriptions were postpaid in October 2011 exhibiting a growth of 0.7 percentage points in a year (Figure 77). Postpaid is especially dominant in Denmark and Finland with a share of 90% of all subscriptions. At the same time in Italy and Malta, prepaid has a share of 83% and 80% respectively.

[66] Analysys Mason: Imagine an M2M world with 2.1 billion connected things …(2011)

Figure 77: Mobile subscribers: prepaid and monthly paid, October 2011

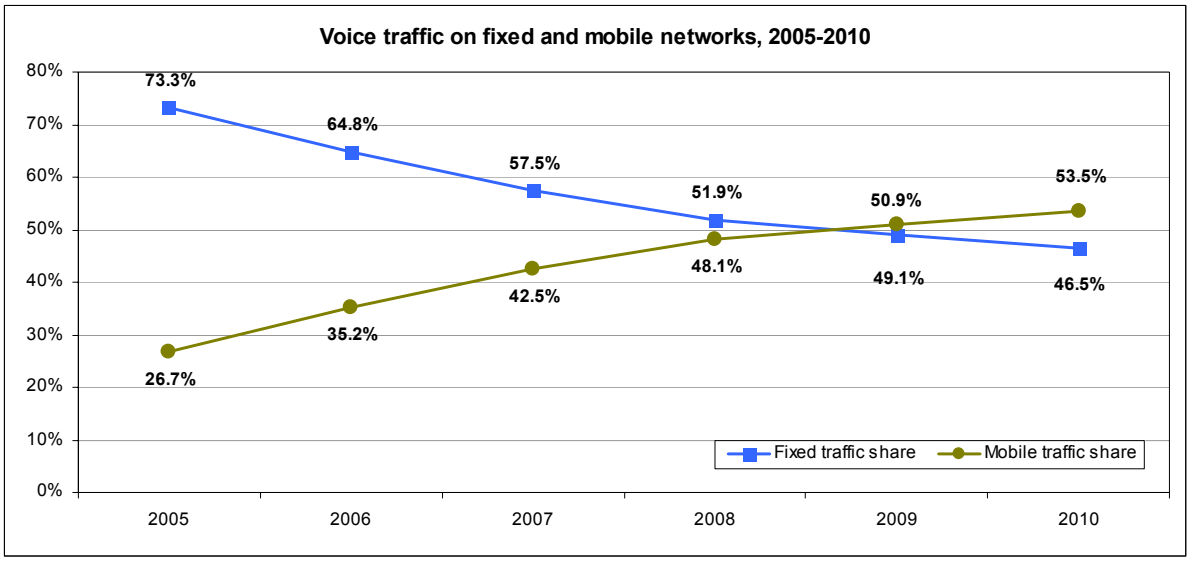


Source: Commission services

2.3.3. Mobile voice traffic development

Mobile voice traffic has recently overtaken fixed PSTN (public switched telephone network) voice traffic (Figure 78) to become the dominant telephone technology based on voice traffic volumes. In 2005, PSTN fixed voice traffic was three times higher than mobile; in 2010 mobile voice traffic was slightly higher than fixed PSTN. This is to some extent caused by the fall in mobile prices as mobile communications became cheaper by 31-42% based on representative usage baskets between 2006 and 2010[67].

Figure 78: Voice traffic on fixed and mobile networks, 2010

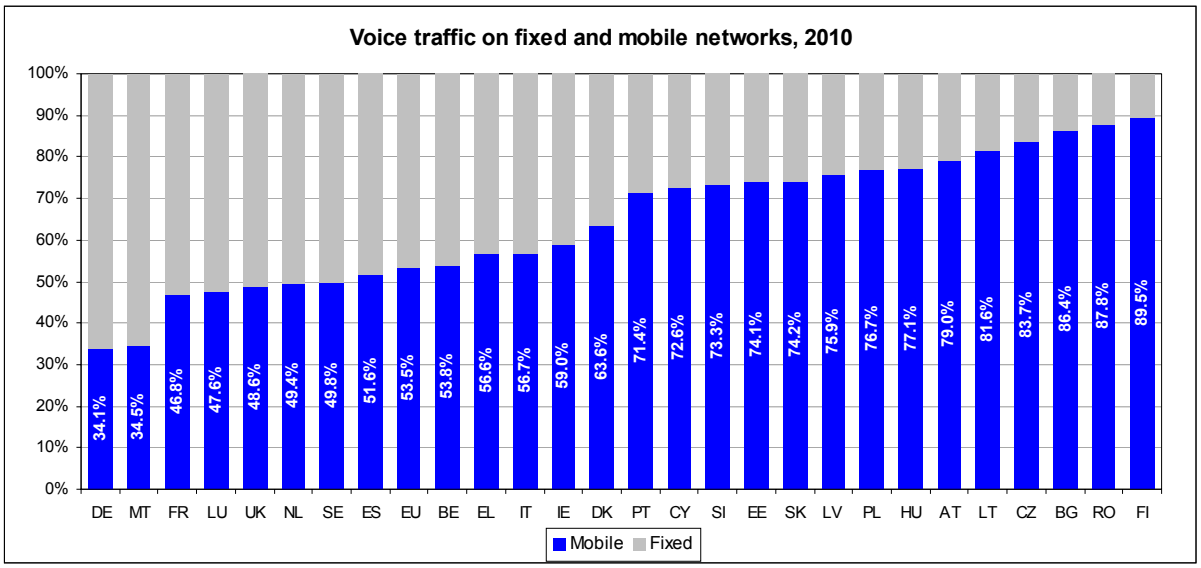


Source: Commission services

[67] Based on the OECD usage baskets, source: Teligen: Report on Telecoms Price Developments (2011)

However, in countries with well established fixed markets, the fixed voice segment remained strong despite the growing mobile penetration: in Germany, France, the UK, Luxembourg, Malta, the Netherlands and Sweden still more than 50% of voice traffic is fixed (Figure 79).

Figure 79: Voice traffic on fixed and mobile networks, 2010

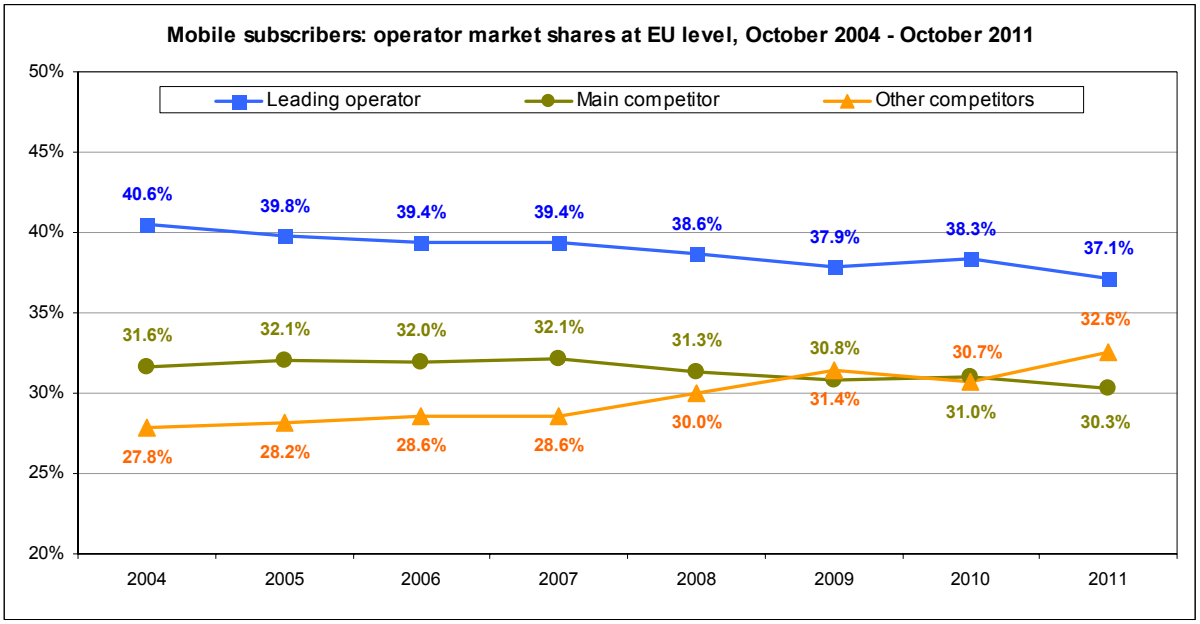


Source: Commission services

2.3.4. Competition in the mobile sector

The mobile sector is the most competitive segment of the telecom market. The market share of leading operators has been slightly declining and stood at 37.1% in October 2011. Main competitors (the second largest operators in the Member States) have also lost market share over the past years (Figure 80). The EU regulations on number portability and the lowering of mobile termination rates contributed to this trend. At the same time, the mobile market remained highly concentrated with more than two thirds of subscribers belonging to the top two operators.

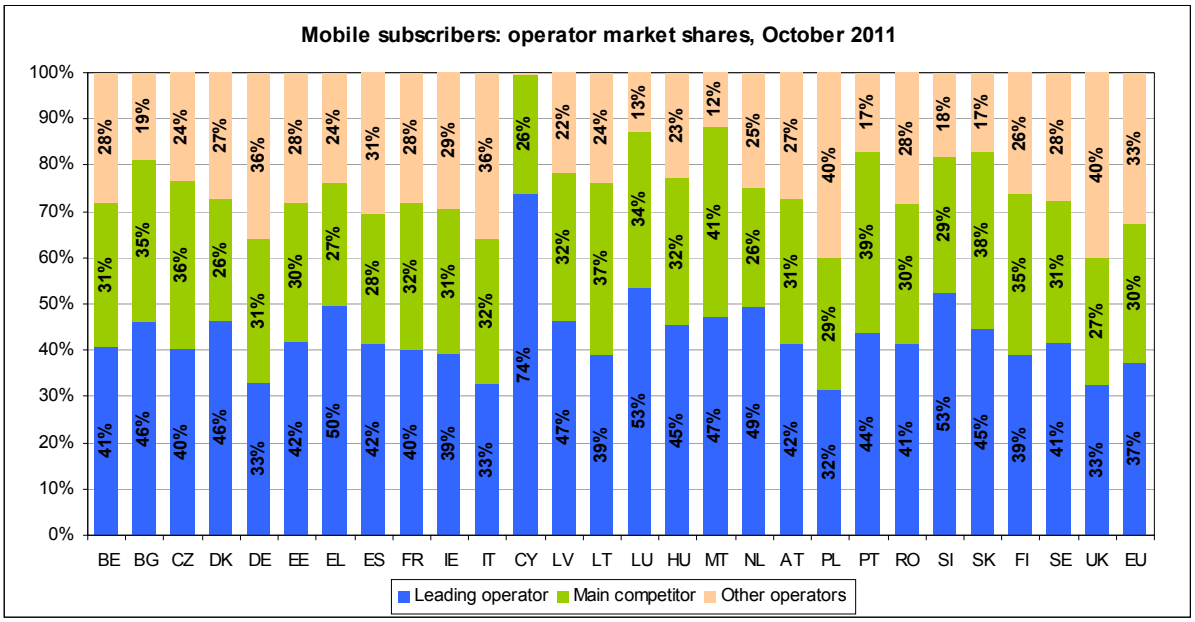
Figure 80: Operators' market shares at EU level, October 2004 – October 2011



Source: Commission services

The highest level of concentration is observed in Cyprus where there are only two Mobile Network Operators. Cyprus is followed by Luxembourg and Slovenia, where the market leader has the majority of the SIM cards. Market leaders are the weakest in Poland (32%), the UK (33%), Italy (33%) and Germany (33%) (Figure 81).

Figure 81: Mobile operators' market shares at EU level, October 2004 – October

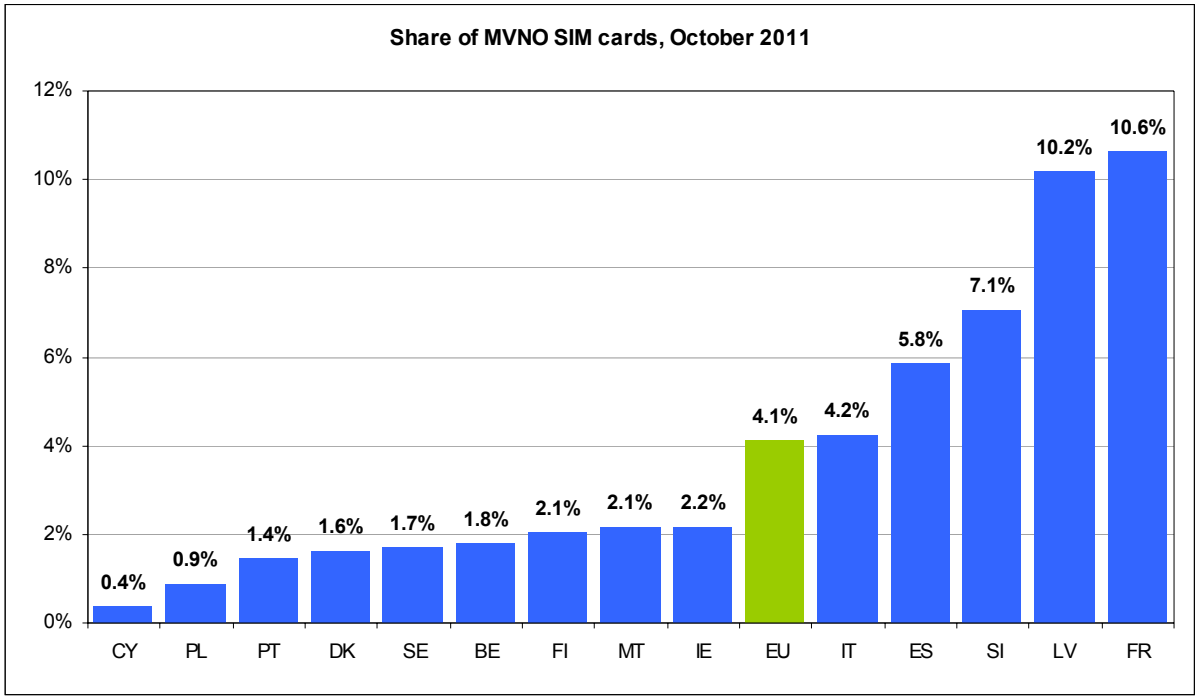


Source: Commission services

The performance of Mobile Virtual Network Operators shows a mixed picture in Europe[68]. MVNOs are defined as operators with their own SIM cards and own mobile network code but without any mobile telecommunications network infrastructure. Operators that fulfil the above two conditions, but are majority owned (more than 50%) by any of the Mobile Network Operators operating in the same national market are not included (e.g. operators being only a sub-brand of a Mobile Network Operator). MVNOs play an important role in Latvia and France where they represent more than 10% of the subscriptions; they are marginal in the majority of the other countries. At the EU level, MVNOs have a market share of 4.1% (Figure 82).

[68] Data is available for 15 Member States only.

Figure 82: Share of MVNO SIM cards – October 2011

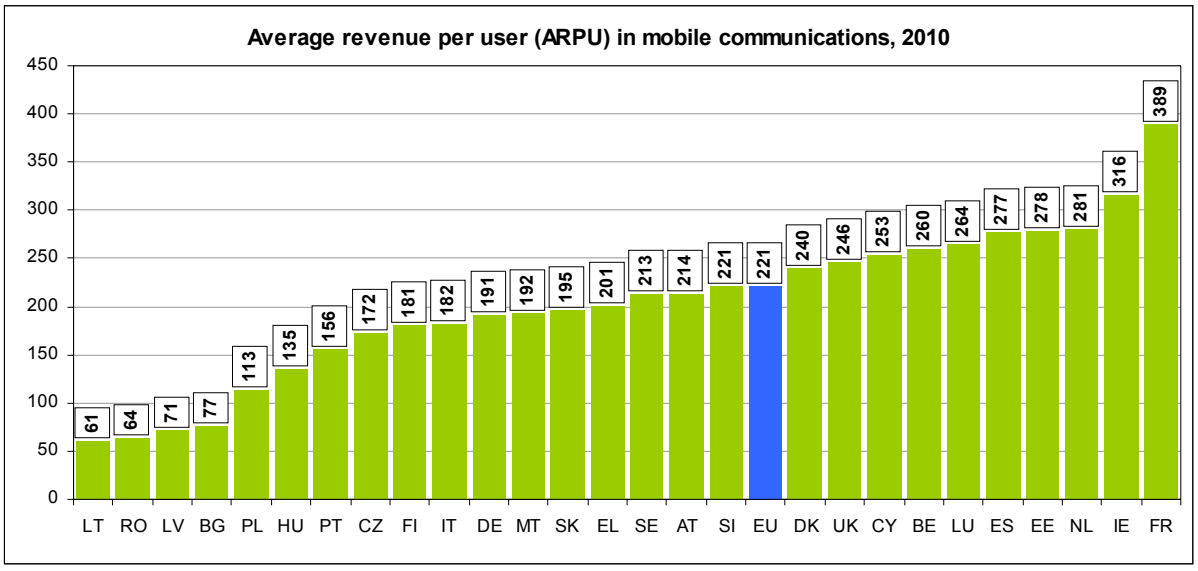


Source: Commission services

2.3.5. Average Revenue per Minute (ARPM) and Average Revenue Per User (ARPU)

Average Revenue per User (ARPU) stood at EUR 221 in 2010 as opposed to EUR 244 a year ago. France had by far the highest ARPU (EUR 389), which is partly caused by the low penetration rate (it is not common in France to have more than one subscription per person). There were four countries with an ARPU of less than EUR 100 per year: Bulgaria, Latvia, Lithuania and Romania (Figure 83).

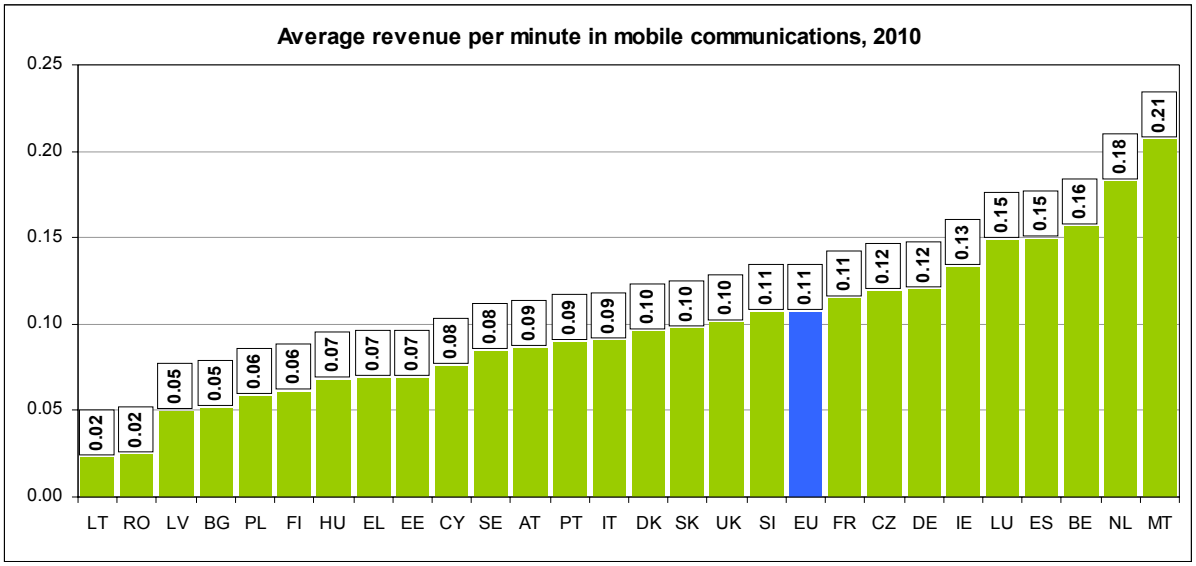
Figure 83: Average Revenue per User (ARPU) in mobile communications, 2010



Source: Commission services

European mobile users paid 11 cents per voice minute on average in 2010 (Figure 84). Malta and the Netherlands[69] were the most expensive countries with 21 and 18 cents per minute (respectively). Average Revenue per Minute has been decreasing over the past years.[70] Although voice usage has increased, this could not compensate for the price drops, so voice revenues have been declining in the EU[71].

Figure 84: Average Revenue per Minute(ARPM) in mobile communications, 2010



Source: Commission services

2.3.6. The direct impact of regulation

2.3.6.1. Mobile number portability

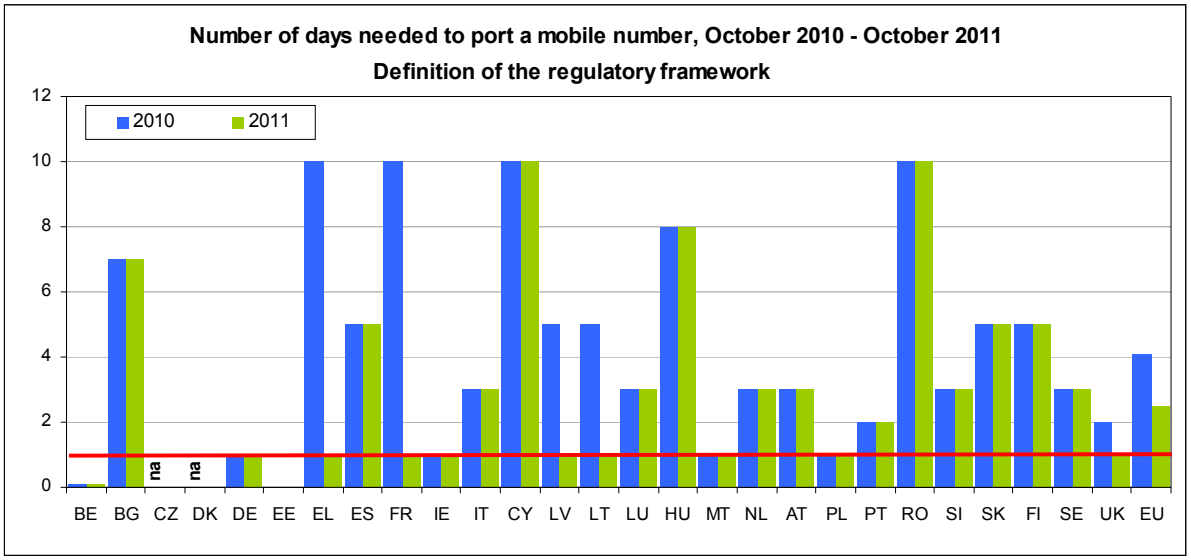
Number portability makes it easier for mobile subscribers to migrate from one operator to another. Although subscribers can port their numbers in all EU countries, in October 2011, it took 2.5 days on average to port a mobile number (Figure 85**Error! Reference source not found.**), which is higher than the maximum permitted in the regulatory framework. Only in eleven Member States can a number be ported in a maximum of one day. At the same time, the transposition of the related provision in the framework at national level has been carried out by most Member States throughout 2011. In addition a number of national regulatory authorities have adopted implementation measures or are in the process of doing so.

[69] In December 2011 the Dutch competition Authority opened an investigation into Dutch mobile network operators.
http://www.nma.nl/en/documents_and_publications/press_releases/web/2011/28_11_nma_confirms_investigation_into_dutch_mobile_network_carriers.aspx

[70] Because of a slight change in the definitions, no comparison is provided with 2009.

[71] Enders Analysis: European Mobile Market Analysis (November 2011)

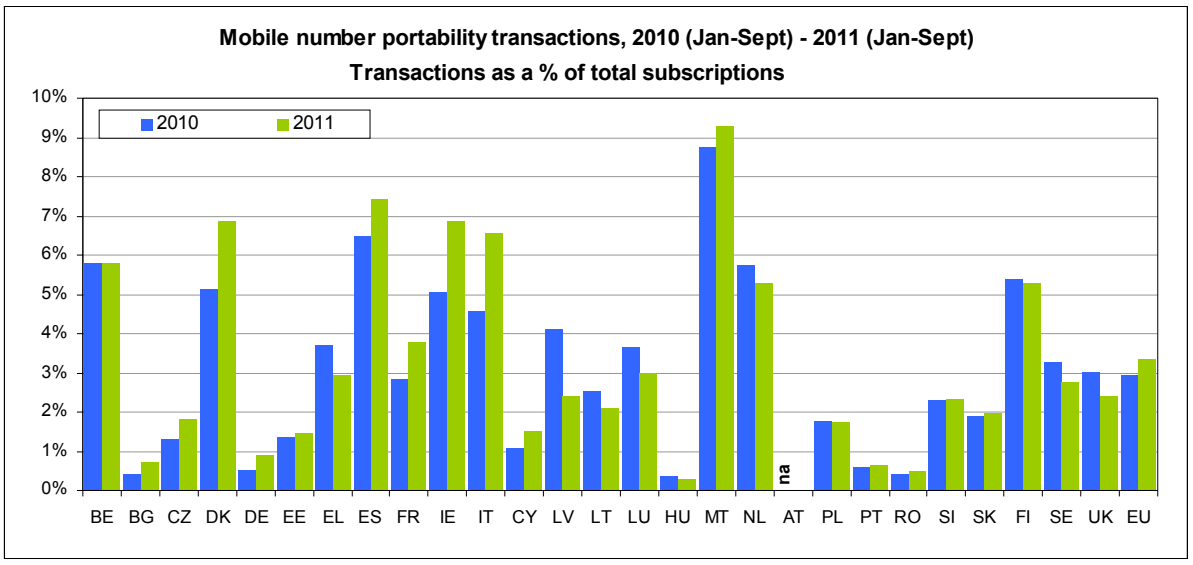
Figure 85: Number Portability: Number of days needed to port a mobile number, October 2011



Source: Commission services

The popularity of number portability varies among Member States (Figure 91**Error! Reference source not found.**). In Malta, Belgium, Denmark, Spain, Ireland, Finland, the Netherlands and Italy more than 5% of subscriptions were migrated using number portability. During the same period, the ratio was below 1% in Bulgaria, Germany, Hungary, Portugal and Romania. At the EU level, there was a slight increase from 2.9% to 3.4% between 2010 and 2011.

Figure 86 Mobile number portability transactions as a % of total subscriptions, 2010-2011

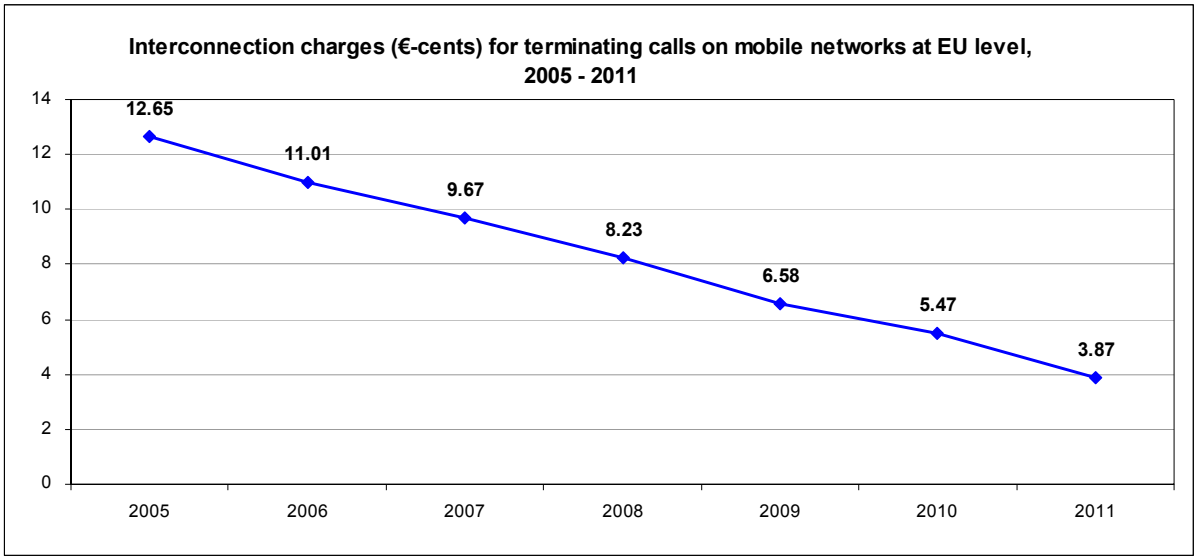


Source: Commission services

2.3.6.2. Mobile termination rates

Mobile termination rates (wholesale charges for terminating calls on mobile networks) have continued to decline. There was a remarkable reduction of 29% last year (Figure 87**Error! Reference source not found.**).

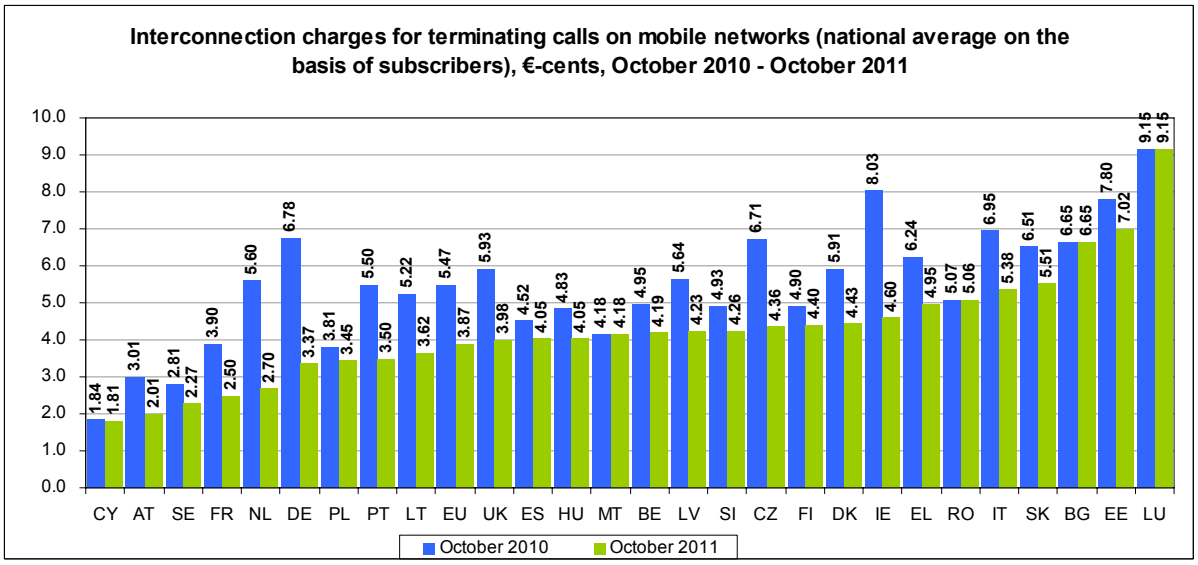
Figure 87: Average mobile termination rates at EU level, 2005-2011



Source: Commission services

Germany, Ireland, and the Netherlands saw the largest decrease in mobile termination rates. In Luxembourg, Estonia and Bulgaria, rates remained very high (Figure 88).

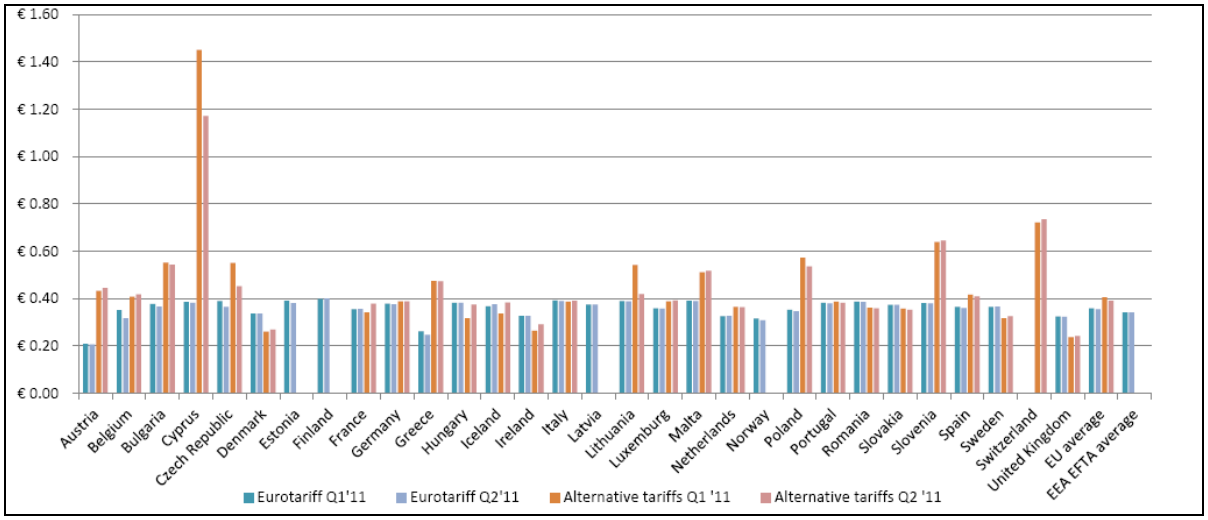
Figure 88 Mobile termination rates by member states, October 2010-October 2011



Source: Commission services

Looking at roaming prices, there is a very high difference between Average Revenue per Minute for all types of calls (EUR 0.11) and calls made while roaming (EUR 0.35) (Figure 89).

Figure 89 Average Retail price per minute for intra-EEA roaming voice calls made, Q1-Q2 2011



Source: BEREC

2.4. Mobile Broadband

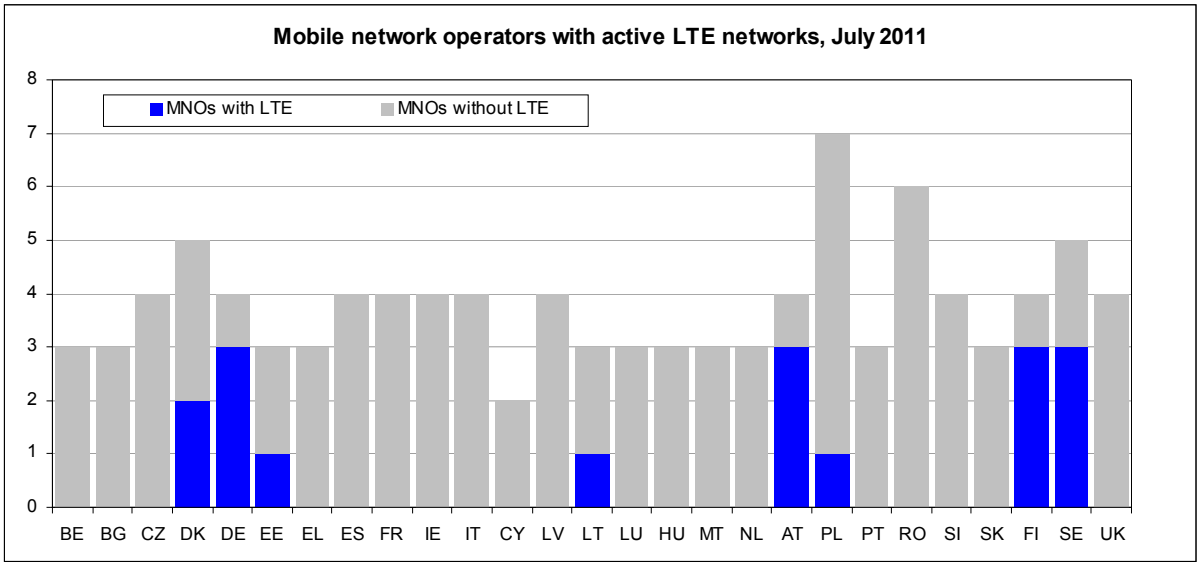
2.4.1. Mobile Broadband coverage

On average, there was 85% population coverage of third generation HSPA networks in the EU in December 2010.[72]

Fourth generation mobile networks are already present in the EU (Figure 90). As of July 2011, LTE services were commercially available in 8 Member States (Denmark, Germany, Estonia, Lithuania, Austria, Poland, Finland and Sweden). Seventeen out of the 105 Mobile Network Operators in the EU had some LTE coverage in July 2011. LTE networks may offer a faster and more reliable mobile internet experience, which can help mobile operators compete directly with fixed broadband technologies.

[72] Idate

Figure 90: Mobile network operators with active LTE networks, July 2011

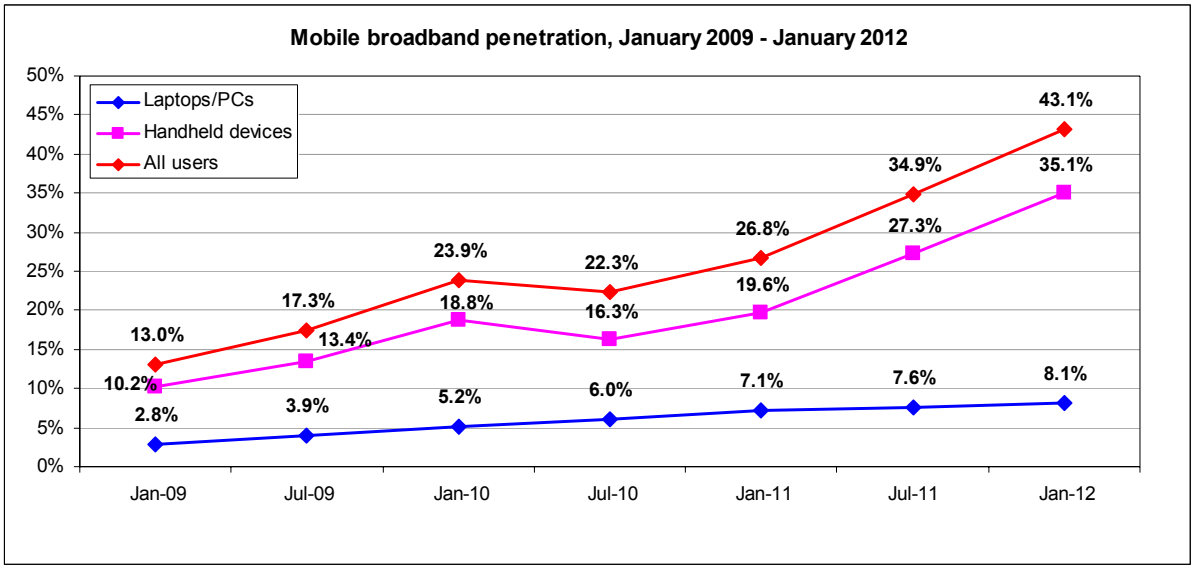


Source: Commission services

2.4.2. Mobile broadband subscriptions/users

Mobile broadband penetration reached 43.1% (use of handheld devices and computers), which is a significant increase compared to six months ago (Figure 91). It is the handheld devices segment, which is responsible for this growth, where penetration increased from 27.3% to 35.1%.

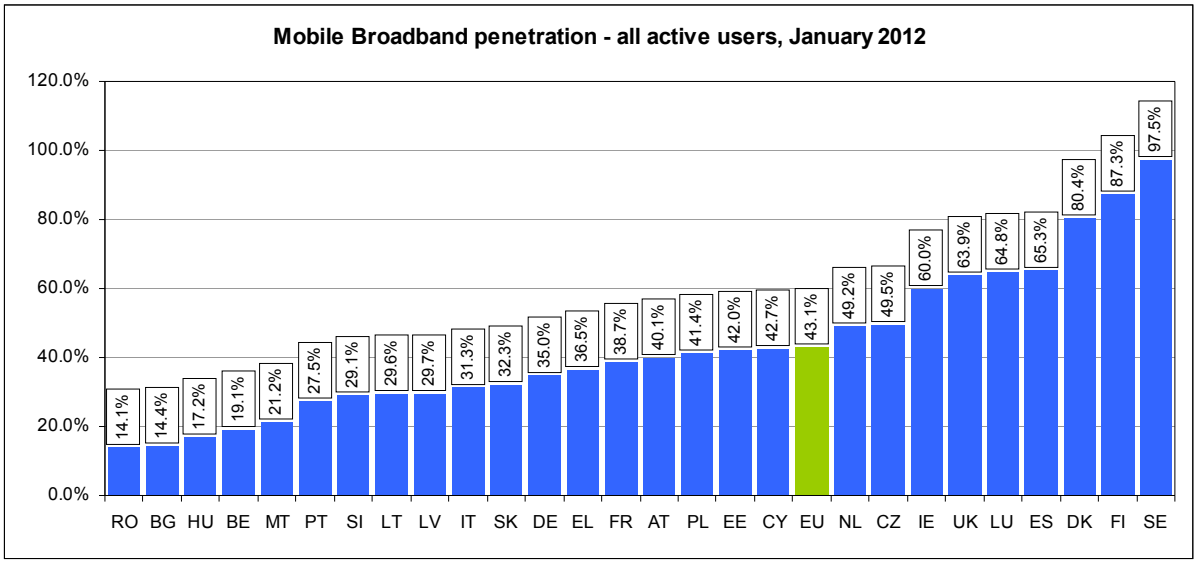
Figure 91: Mobile Broadband penetration at EU level



Source: Communications Committee

Looking at all active users at the Member State level mobile broadband is most popular in the Nordic countries where penetration is above 80%. Four Member States have a mobile broadband penetration rate lower than 20% (Figure 92).

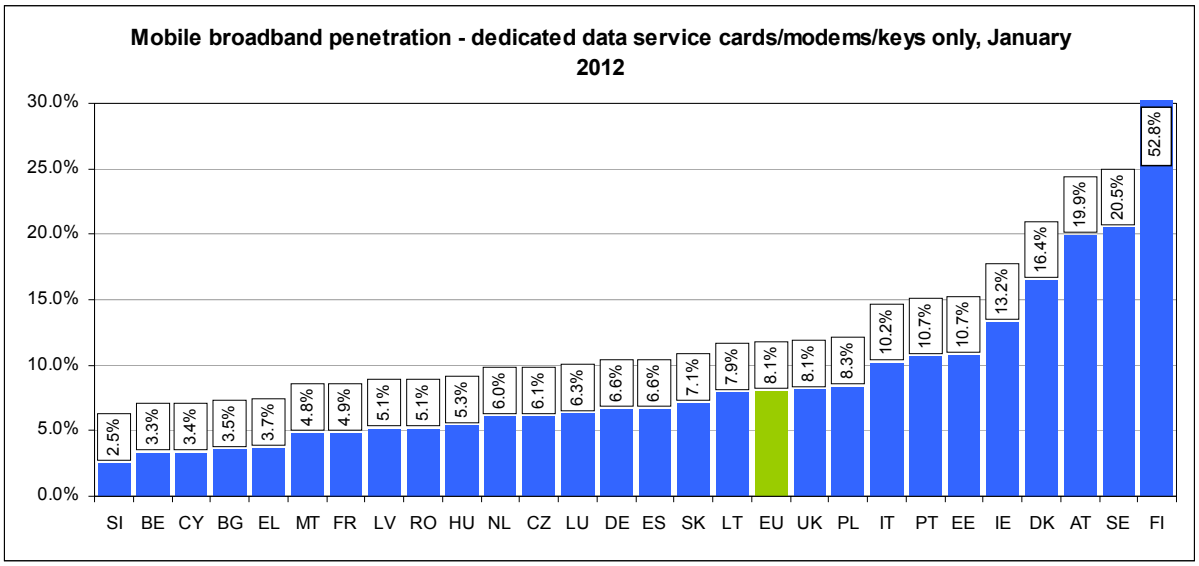
Figure 92: Mobile Broadband penetration – all active users



Source: Communications Committee

The penetration of mobile broadband as measured by dedicated data service cards/modems/keys increased from 7.6% to 8.1% in the last six months, which represents a slowdown compared to growth rates seen in the 2009-2010 period (Figure 93). Nordic countries and Austria have the highest penetration rates. LTE may help operators achieve accelerated growth in the coming years.

Figure 93: Mobile Broadband penetration – dedicated data service cards/modems/keys only, January 2012



Source: Communications Committee

Globally, mobile broadband subscriptions are expected to increase from 900 million in 2010 to 4.7 billion in 2016. This would imply that more than 50% of mobile subscriptions would

use mobile broadband[73]. Smartphone sales support this trend; in Q3 2011, smartphones represented 53% of handset sales in the five largest Western European countries[74].

2.4.3. Mobile Broadband usage

Mobile data traffic surpassed voice traffic in Q4 2009 and was more than twice as high as voice traffic in Q2 2011. By 2016, mobile voice traffic will be marginal compared to data traffic[75]. European mobile broadband traffic is expected to double in 2012. In 2016, total European mobile broadband traffic will be 14.5 times higher than in 2011. Mobile video represented slightly more than 50% of total mobile traffic, which is forecasted to go up to 70.5% by 2016. Smartphones are expected to generate 48% of total mobile broadband traffic followed by laptops and netbooks (24.2%) and tablets (10%) in 2016. Average usage varies greatly between smartphones, tablets and laptops/netbooks. A massive growth is forecast for all three categories[76].

Table 3: Mobile broadband average usage (MB/month) for device categories

Device	2010	2011	2016
Smartphones	55	150	2576
Tablets	405	517	4223
Laptop, netbook	1460	2131	6942

Source: Cisco

Mobile broadband speeds are increasing; in 2011 the average connection speed was 1.3 Mbps globally, which is an increase of 39% compared to 2010. In 2016, the average connection speed on smartphones will go up to 5.1 Mbps[77].

Based on a US survey[78] of smartphone users, 89% use their smartphones for purposes other than voice calls every day: 81% browse the internet, 77% use a search engine, 68% use an application and 48% watch video at least once a week. As for the purpose, 89% used smartphones to stay connected, 82% to research and read news, 75% to navigate, 65% to keep entertained, 45% to manage and plan, 95% to look for local information and 79% for shopping related activities.

A survey on the mobile use of the internet will be conducted by Eurostat in 2012 in all Member States. Findings of this research will be published in the Digital Agenda Scorebaord next year.

2.4.4. Conclusions

The European mobile industry focused mainly on mobile broadband in 2011. Mobile broadband is the segment exhibiting the fastest growth rate in the telecoms services market and it has the potential to compensate for declining voice revenues in the coming years. Mobile operators have been heavily investing in HSPA (High Speed Packet Access) networks to keep pace with the growing number of mobile broadband users and the exponentially

[73] Ericsson: Traffic and market data report (November 2011)
[74] Enders Analysis: European Mobile Market Analysis (November 2011), Five largest Western European countries: Germany, UK, France, Italy and Spain
[75] Ericsson: Traffic and market data report (November 2011)
[76] Cisco Visual Networking Index: Global Mobile Data Traffic Update, 2011-2016 (2012)
[77] Cisco Visual Networking Index: Global Mobile Data Traffic Update, 2011-2016 (2012)
[78] Google/IPSOS OTX MediaCT: The Mobile Movement (April 2011)

increasing traffic. The number of mobile broadband users increased by 61% in the EU in a year while global mobile broadband traffic more than doubled in 2011. Fourth generation mobile broadband (LTE) is already available in eight EU Member States. LTE may help mobile operators compete directly with fixed broadband technologies; that would completely change the competitive situation of the broadband market. Consequently, the wider use of LTE could stimulate investments in the fixed broadband environment, i.e. it can accelerate the transition from legacy broadband to NGA technologies. Nevertheless, mobile operators need to follow developments in voice revenues very cautiously as voice still represents 86% of revenues. A strong decline in voice revenues could definitely threaten investments in mobile broadband networks.

2.5. State of the telecoms services sector in Europe

After a slight decline in revenues in 2010, the negative growth rate of revenues[79] in the European telecoms sector accelerated in 2011 due to a worsening of the European economy. Domestic revenue growth for most European carriers was negative in 2011 although some operators were able to experience some growth in overall revenue thanks to the diversification of their businesses in emerging markets. In line with the economy, the situation of the telecoms market in Europe is worse than in 2010 with growth mainly sourced from the mobile and fixed data markets. However, despite the worsening of the economic situation, mainly due to the pressure of the sovereign debt crisis, EU GDP in 2011 is estimated to have grown by 1.5%, contrasting with the decline of carrier services revenues in Europe of 1.3%.

Mobile and fixed operators are under pressure to upgrade their networks to cope with booming demand for internet-connected phones and PCs. However, operators still seem to lack sufficient incentives to invest in next generation networks due to sluggish demand and the positive revenue stream generated by existing copper networks and current business models.

In the short term, as data traffic is increasing and (partly) substituting voice or SMS traffic, operators are focusing on revenues arising from internet access through the development of integrated tiered pricing plans or agreements with over-the-top internet platforms. Also, strategies focus on cutting prices only to specific groups of consumers (for instance discounts on tariffs only through operators' websites), avoiding price wars between carriers.

2.5.1. Revenues

Table 4: Telecoms sector growth

	Growth rate (2009-20010)	**Growth rate (2010-2011)**	**Share in e-communication services revenue (2011)**
Fixed voice telephony and Internet access and services	-2.9%	-3.4%	35.0%
Fixed voice telephony	*-7.6%*	*-7.1%*	*21.3%*
Internet access and services	*6.4%*	*2.9%*	*13.8%*

[79] Based on EITO and the operators' financial statements.

Mobile voice telephony and mobile data services	0,2%	-0,8%	46.4%
Mobile voice telephony	*-3.3%*	*-4.7%*	*32.6%*
Mobile data services	*11.1%*	*9.8%*	*13.8%*
Business data services	-1.1%	0.4%	7.4%
Pay TV	6.1%	2.5%	11.1%
Total Telecom services (carrier services)	**-0.4%**	**-1.3%**	**100%**

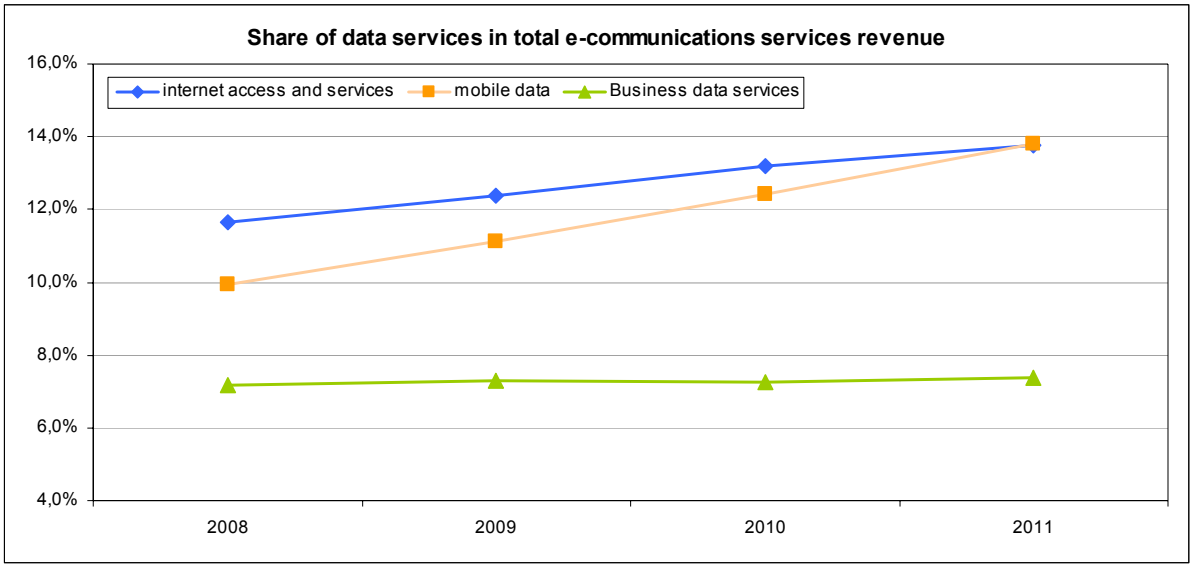
Source: EITO 2011

The negative growth of revenues coming from telecoms services in Europe accelerated to -1.3% in 2011[80], from -0.4% in 2010; in absolute figures, carrier services' revenues were EUR 278.9 billion in 2011. Taking into account the whole EU telecom sector (carrier services plus telecom equipment), revenues were EUR 354 billion in 2011; that compares to EUR 356 billion in 2010. Revenues from voice are still the main driver (accounting for 54% of revenues for EU telecom operators) but its importance continued to decrease (-7.1% in the case of fixed voice telephony and -4.7% in the case of mobile voice telephony) while revenues from data (27.6% of the total for individuals and households and 7.4% for companies) kept on growing, in particular revenues for data related to mobile services (+2.9% in the case of fixed internet access and +9.8% in the case of mobile data services).

Worldwide revenues for telecoms services presented a 3.1% year-on-year revenue increase in 2011, which contrasts with the trend in the EU market (Figure 94).

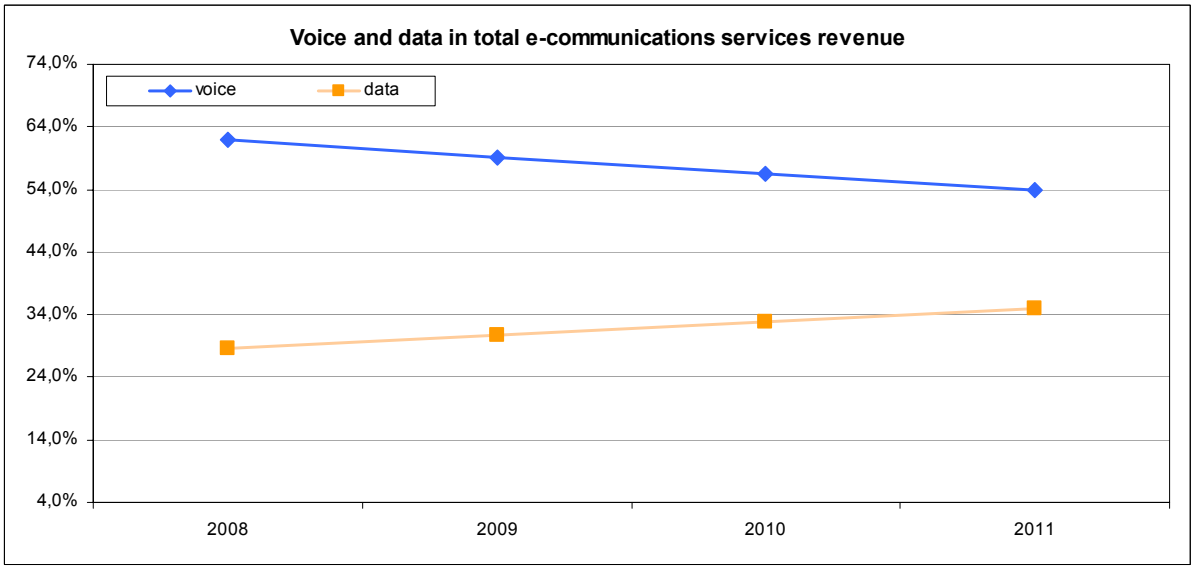
[80] EITO January 2011.

Figure 94: Share of data in mobile, fixed and business



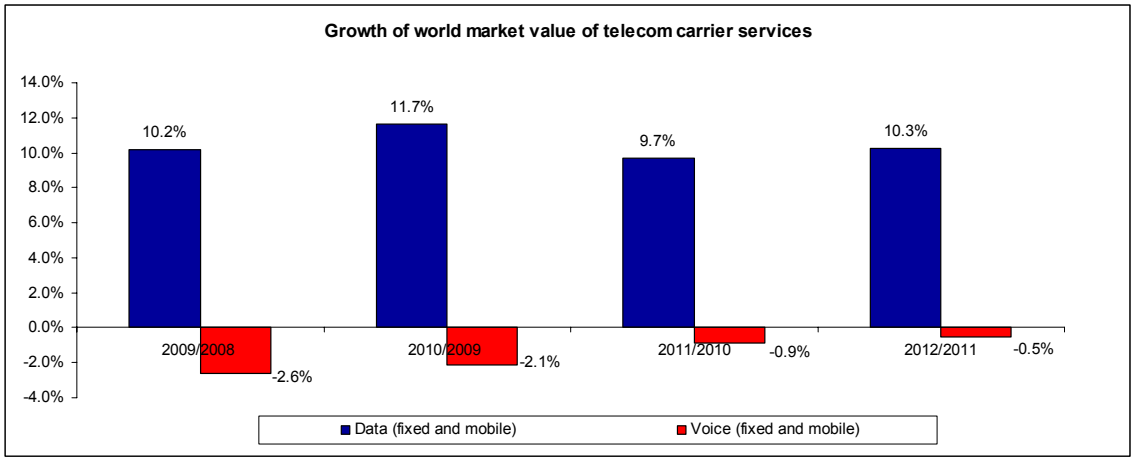
Source: EITO 2011

Figure 95: Voice and data as total revenues for carrier service



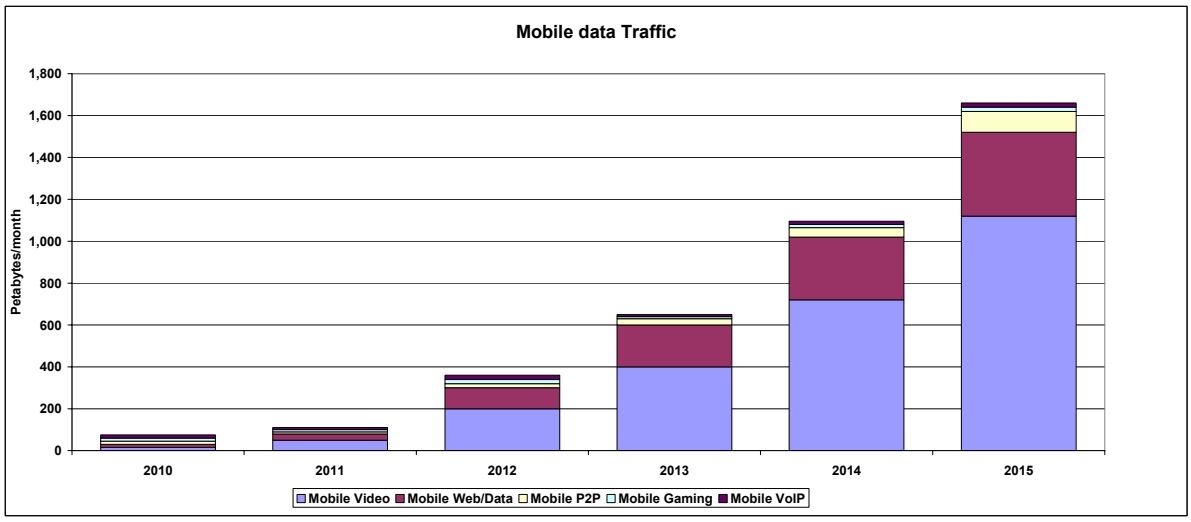
Source: EITO 2011

Figure 96



Source: EITO 2011

Figure 97



Source: Source: Cisco Visual Networking Index (VNI) Global Mobile Data Traffic Forecast, 2010–2015

Sources of revenue growth are shifting. All the areas that have traditionally made money, like voice calls and SMS, are being eclipsed while data demand on networks is growing steadily. As for data revenues, the gap between mobile and fixed data revenues continued to widen in 2011 although the contribution of data revenues arising from mobile networks accounted for the same percentage (13.8%) to total revenues in 2011 as the contribution from fixed networks.

Electronic communications account for more than half of revenues in the ICT sector. However, the importance of the IT sector, especially IT services, is attracting the attention of operators. The reason for this is that operators need to change their business model to keep on growing and cloud computing services are offering new opportunities for diversification.

2.5.2. *Investment and access to finance*

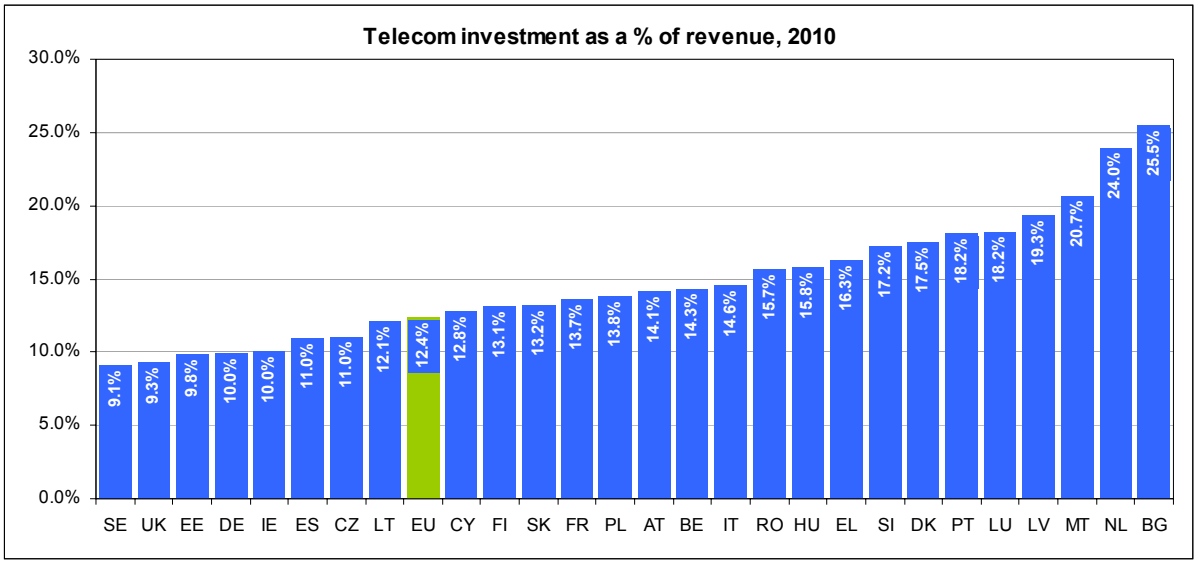
As indicated above, the economic crisis contributed to the decline in operators' revenues in their domestic markets. For the main EU operators[81], domestic revenues declined by about 4.5%, although this decrease in revenues was compensated by a 17.3% increase in revenues made by European operators in markets outside Europe.

A weighted average of Capex (capital expenditure) [82] increased by about 7.5% for many operators due, to some extent, to investment in coverage and high speed broadband. The big funds needed to roll out NGA networks prompted several major operators to team up to share the costs to reduce Capex and operating costs. Overall, capital expenditure rebounded compared to the previous year. The increase in Capex[83] was thanks to an increase of 2.1% in fixed equipment. Meanwhile, there was a decrease of 1.5% in expenditure on mobile.

Capex over revenues increased by 0.4 percentage points in 2010 compared to the previous year (Figure 98).

The weighted average EBITDA margin[84] for the main European operators decreased by 4.8% in 2011 compared with 2010.

Figure 98: Telecom investment over revenue



Source: Commission services

[81] A sample with a group of eighteen European operators: Deutsche Telekom, Telefonica, Vodafone, Orange, Mobistar, TPSA, KPN, Telecom Italia, Tele2, Telia Sonera, Telekom Austria, Belgacom, TDC, Portugal Telecom, Elisa, OTE, Telenor and BT. Third quarter 2011-Third quarter 2010 growth rates.

[82] Capital Expenditure based on our sample of European operators. Third quarter 2011-Third quarter 2010 growth rates.

[83] EITO January 2012. Capex figures for 2010. No figures yet available for 2011.

[84] EBITDA over revenues based on the sample of European operators. Third quarter 2011-Third quarter 2010 growth rates.

3. ICT R&D, INNOVATION AND GROWTH

- Recent developments in ICT include social networks, smart phones, apps stores, e-readers and cloud computing. For the global ICT industries, this innovation wave came at the same time as the economic slow down.

- The benefits of this innovation wave have not been reaped equally globally. The share of the ICT sector in the United States has increased more rapidly than in Europe. In the United States, the value-added at current prices increased by 8% between 2007 and 2010. This compares with a 5% decrease in the EU. In real terms, the value added by ICT increased by 18% in the United States and 7% in the EU.

- The US performance relied on a spectacular improvement in ICT manufacturing. Between 2007 and 2010, the value-added in this sector increased by 34% at current prices and by 60% in volume.

- Business ICT R&D intensity (measured by Business R&D over ICT value-added) has been resilient with only a minor decrease from 5.35% in 2008 to 5.33% in 2009.

- In the EU, out of the 7 million jobs in ICT in 2010, 5.7 million were in ICT services.

- Innovation has contributed to welfare gains and economic growth in a far more visible way. Investments in intangibles are now making an average 25% contribution to labour productivity growth.

ICT is pervading modern life and has become a general-purpose technology. Its impact on the growth of modern economies has taken place in different waves. First, during the late 1990s, an impressive increase in computing power led to a huge decline in the price of ICT goods, giving investors an incentive to replace other forms of capital with ICT equipment. These productivity dynamics led to an increasing contribution from the ICT sector to economic growth. After 2000, ICT also created economic growth in other sectors of the economy as declining prices made ICT an attractive factor of production for the whole economy and led to even greater investments in ICT, stimulating labour productivity growth, especially in the services industries. The increased use of ICT has also contributed to higher efficiency gains (total factor productivy growth), an effect more visible in the United States than in the EU. This required a broader investment strategy, encompassing intangible capital such as research and development, workforce skills, organisational capital, and marketing and branding. Whatever the size, the business and the location of the enterprise, the ICT part of its equipment and the efficiency with which firms and organisations are using it is shaping new processes in reaching suppliers and customers and in developing new products and services.

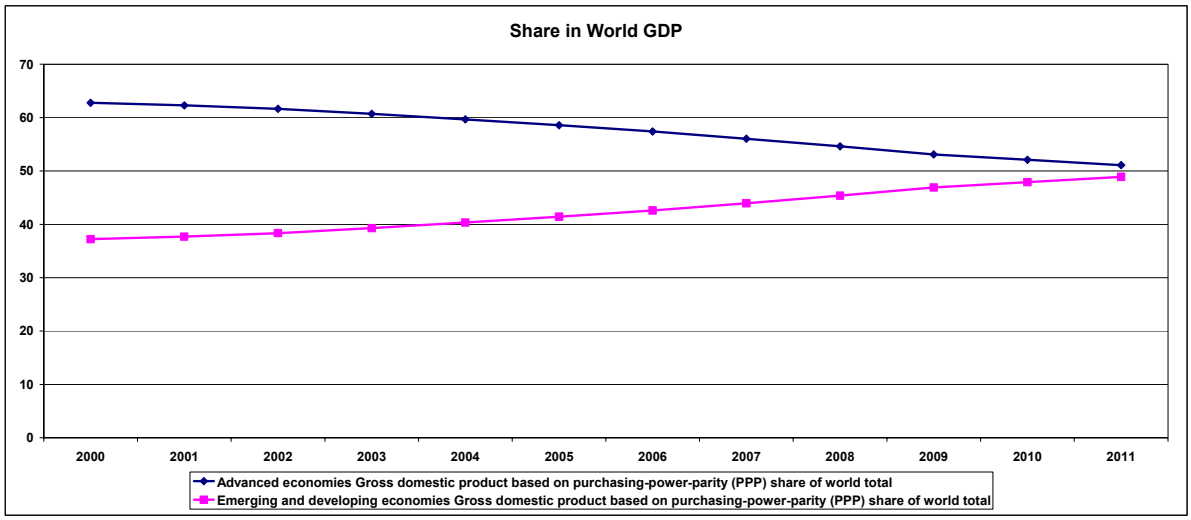
This chapter looks at the performance of the ICT sector in Europe during the economic crisis relative to that of the United States. It assesses its impact on R&D, growth and it provides evidence on the role of intangibles as the impact of ICT spills over to other sectors of the economy.

3.1. The ICT industry in the economy and during the business cycle 2007-2008

This chapter measures and analyses the performance of the ICT sector and the trends in investment in ICT R&D while taking into account three recent developments:

- **The financial crisis led to the current economic slowdown.** The European ICT sector weathered the crisis but its recovery is weaker than in the United States.
- **The spread of new applications.** The internet 'new wave' has led to the development of social networks, smartphones, apps stores, e-readers and cloud computing. For the global ICT industry, this innovation wave came at the same time as the economic crisis. Market structures in the ICT sector have been deeply shaken, yielding truly disruptive changes with big winners and big losers. It has led to bankruptcies, exits (divestitures), acquisitions, new entrants and a significant wave of patent litigation. Changes in the relative positioning are visible at country level. The United States has improving its position as market leader while the EU and Japan remain weaker.
- **The new economic geography**. In 2012, developing and emerging market economies together accounted for one half of global economic activity as measured by gross domestic product (GDP), up from less than one-third in 1980, according to the IMF (Figure 99).

Figure 99: Share in World GDP



Source: International Monetary Fund, World Economic Outlook Database, April 2012

The growth potential of the internal market of developed countries such as the United States, the EU or Japan, given different factors such as demographic trends, will nearly exclusively rely on technological progress (productivity gains). By contrast, developing and emerging countries still have a huge 'catching-up' growth potential. Access to these markets and the competitiveness of Europe's industries will be a key component of future economic growth.

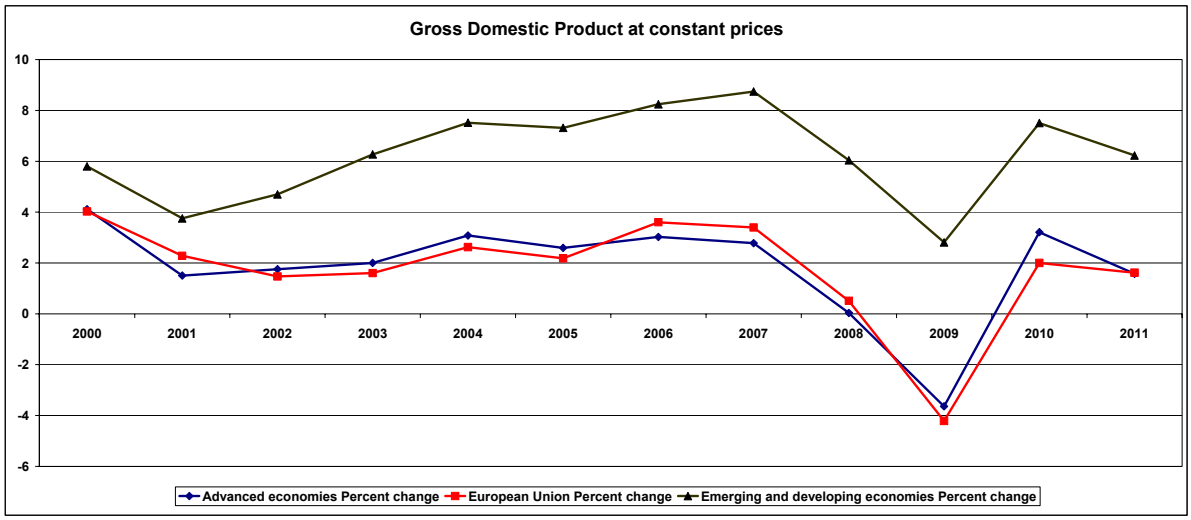
3.1.1. ICT and the economic slowdown

The financial crisis of 2008-2009 led to a free fall in confidence of both consumers and businesses. As a result, the crisis spread to the real economy, generating a fall in production, trade, investment and a massive de-stocking of inventories[85]. Although Europe's economy quickly started to recover, the European sovereign debt crisis brought about new uncertainties and weaker growth prospects (Figure 100). EU GDP is now expected to stagnate and shrink by 0.3% in the euro area in 2012[86].

[85] DG ECFIN, Economic crisis in Europe: Causes, consequences and Responses, European economy 7/2009

[86] DG ECFIN, Interim Forecast February 2012

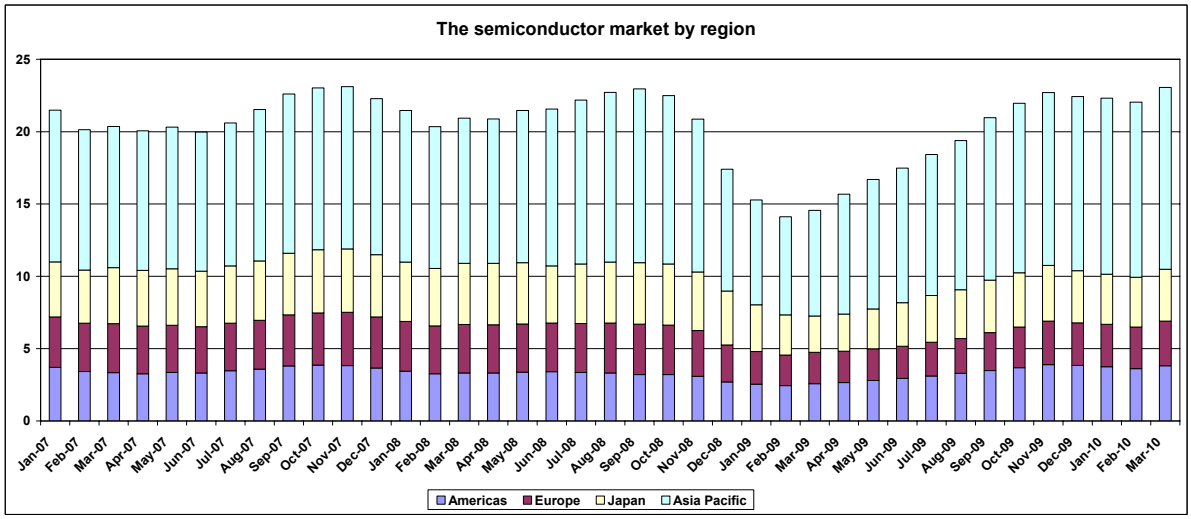
Figure 100: GDP Growth



Source: International Monetary Fund, World Economic Outlook Database, April 2012

The ICT industries did not escape the crisis. The fall in production and in trade during the last quarter of 2008 and the first quarter of 2009 was significant. The semiconductor industry is a good leading indicator of the overall ICT industry (hardware) business cycle (Figure 101). Between the third quarter of 2008 and the first quarter of 2009, combined sales declined by 40%. After this near-record[87] decline, sales rebounded as spectacularly as they fell and already by the end of 2009, combined sales had reached their pre-recession level, showing that the crisis had indeed been one of confidence (inventory cycle).

Figure 101: Semiconductor market (in billions of $)



Source: OECD Information Technology Outlook 2010

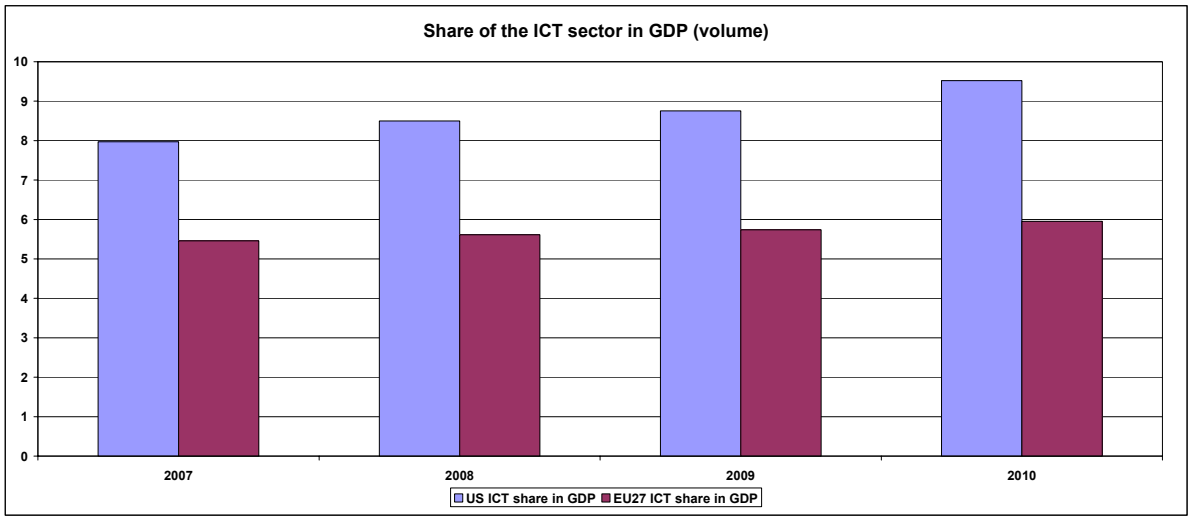
[87] Less than after the dot.com crash of 2000

3.1.2. The European ICT industry

3.1.2.1. The 2007-2010 disruption

Notwithstanding the differences among the different segments of the ICT industry and across firms in the same sector, on aggregate there is some evidence of a weaker recovery of Europe's ICT industry (relative to the 2007 pre-recession level), in particular in comparison with the United States (Figure 102). The European industry did not succeed in harvesting the benefits from the new innovation wave as much as US companies did[88]. In the US, the ICT industry's value-added at current prices increased by 8% between 2007 and 2010. This compares with a 5% decrease for the EU. In *real* terms, ICT value-added increased by 18% in the US and 7% in the EU. As a consequence, the share of the ICT sector in the European economy increased but not by the same proportion as it did in the United States (Figure 102).

Figure 102: Share of the ICT sector in GDP (volume)



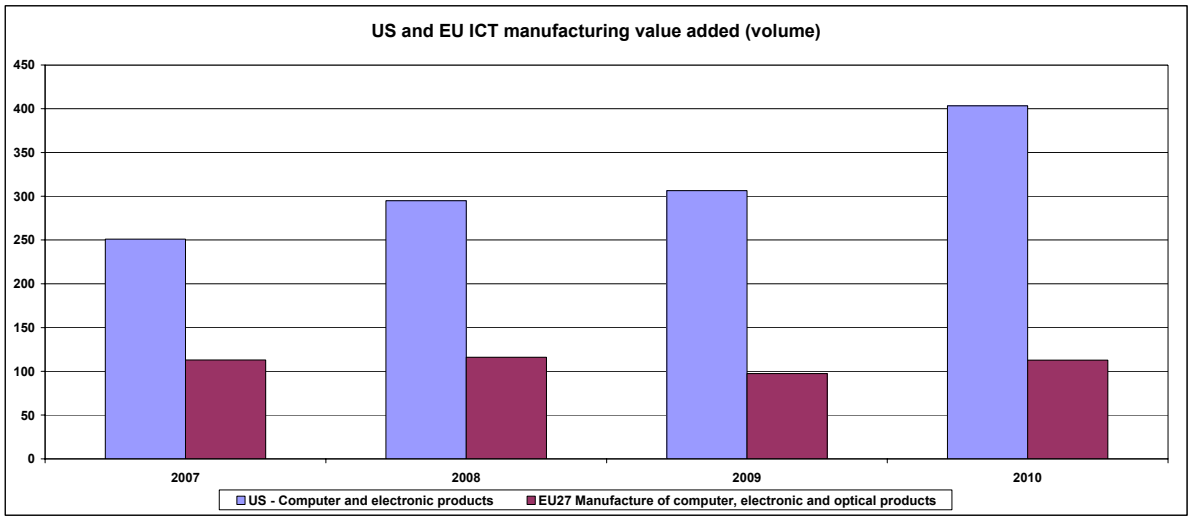
Source: Eurostat and US Department of Commerce (Bureau of Economic Analysis)89, activities based on the definition in footnote 86.

The US performance relies on an increase in the value-added of ICT manufacturing. Between 2007 and 2010, the value-added increased by 34% at current prices and by 60% in volume (chained 2005 dollars) (Figure 103).

[88] The European and American industrial classification differ from the European classification. To compare the two regions using the most updated statistical releases, we must add to the sensu stricto ICT sectors the content industries: all publishing activities (and not just software publishing), motion picture, video, television and broadcasting programme activities. See annex 1

[89] For 2010, NACE 58 (Publishing including software) and NACE 95 (Repair of computers) are estimated (extrapolation)

Figure 103: US and EU ICT manufacturing value added (volume)



Source: Eurostat and US Department of Commerce (Bureau of Economic Analysis)

Box 1 ICT share in GDP: nominal versus volume

If, *ceteris paribus*, all prices were to double, nominal GDP would double while real GDP would be unchanged. This is why in most analyses GDP is expressed in real (volume) terms.

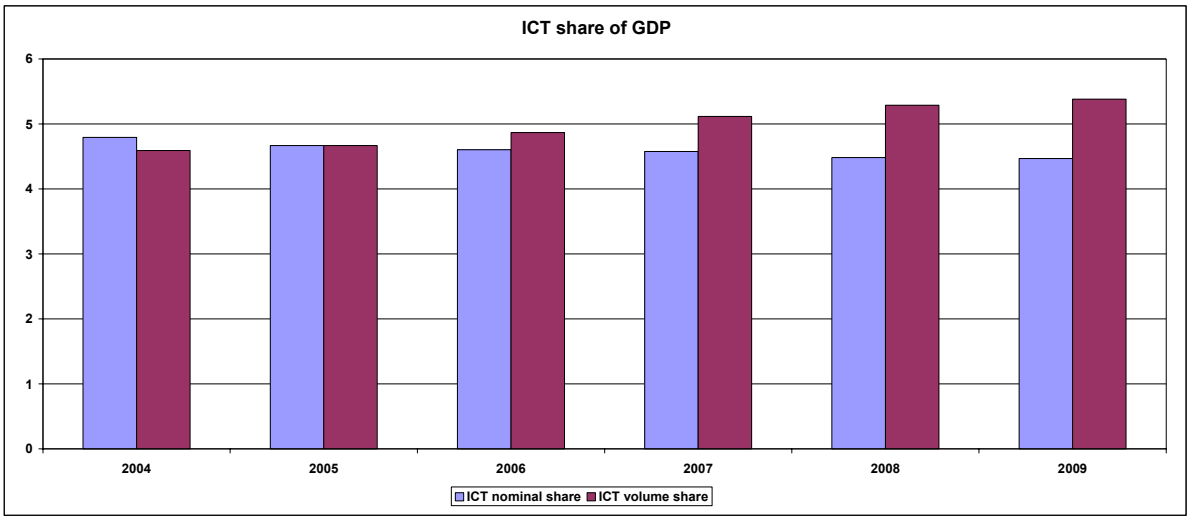
What is particular to most ICT goods is that their price decreases and their quality increases, driven by technological progress and competition. Values expressed in real terms are higher than in nominal value.

ICT price deflators are a proxy of technological progress while the difference between nominal and real value is a proxy of welfare gains (technological progress being forwarded to the consumer in price and in quality).

From the point of view of the production factors, it is the nominal value (turnover, value added) that determines employment, wages and return on capital. This is why employment is related to nominal value-added in the charts' analyses of the ICT industry by sector.

Last but not least, GDP deflators, taking into account quality adjustments, are not harmonised internationally, which casts some doubts on the accuracy of international comparisons.

Figure 104

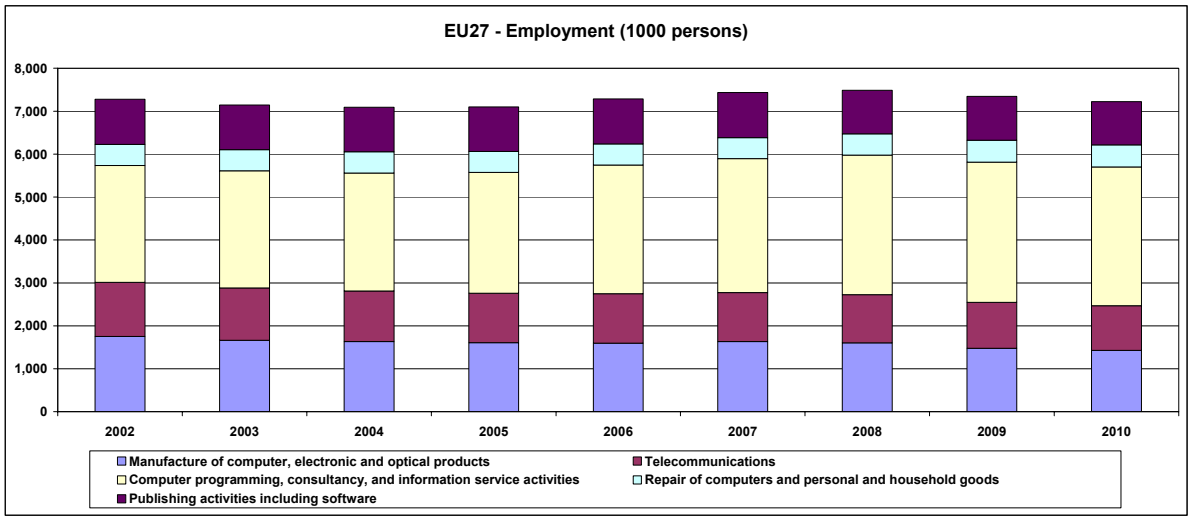


Source: Eurostat; Volume at 2005 prices

3.1.2.2. The European ICT sectors

The EU's ICT industry provides jobs to about 7 million people. Most jobs are in software and IT services; the trend shows there is continuous job creation while the number of jobs created in ICT manufacturing and telecommunications is declining due to international trade specialisation, productivity gains (technological progress) and internal market efficiency gains (competition) (Figure 105).

Figure 105: EU27 - Employment (1000 persons)

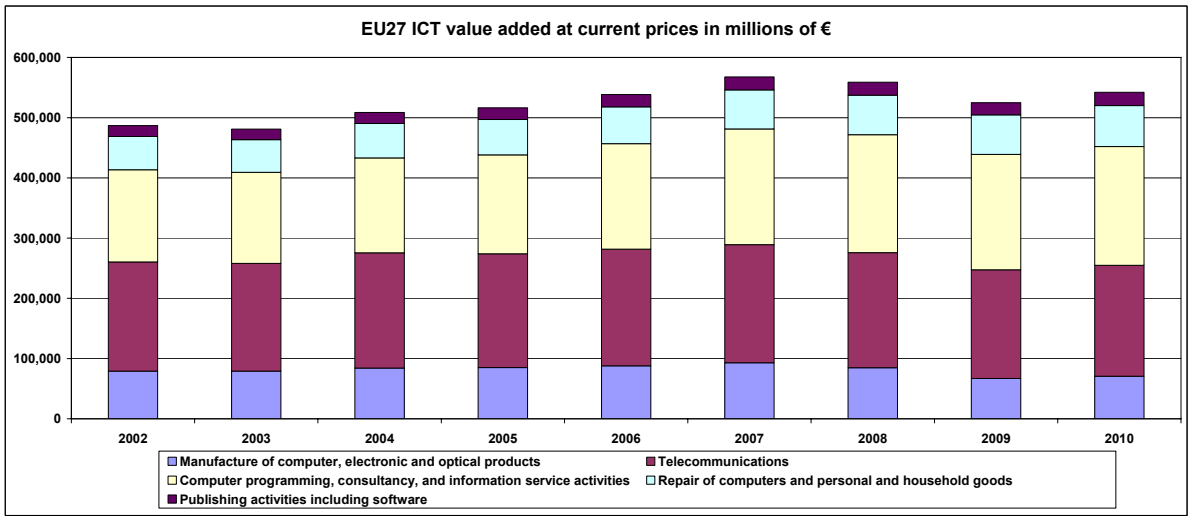


Source: Eurostat, national accounts by industry (NACE Rev.2 by 64 braches)90

As ICT spreads to nearly all activities, ICT-related employment is much higher than that of just the ICT sector. According to the OECD, the share of ICT-intensive occupations in the total economy amounted to 22% in 2009 for the EU15[91].

In the EU27, the ICT industry's value-added at current prices exceeded EUR 500 billion with significant differences between ICT segments, similar to the employment picture, although telecom services have a much higher share in terms of value-added than in employment (Figure 106).

Figure 106: EU27 ICT value added at current prices in millions of €



Source: Eurostat, national accounts by industry (NACE Rev.2 by 64 braches)[92]

[90] For 2010, Publishing, including software (NACE 58), and Repair of computers (NACE S95) are estimated (extrapolation)

[91] OECD Information Technology Outlook 2010

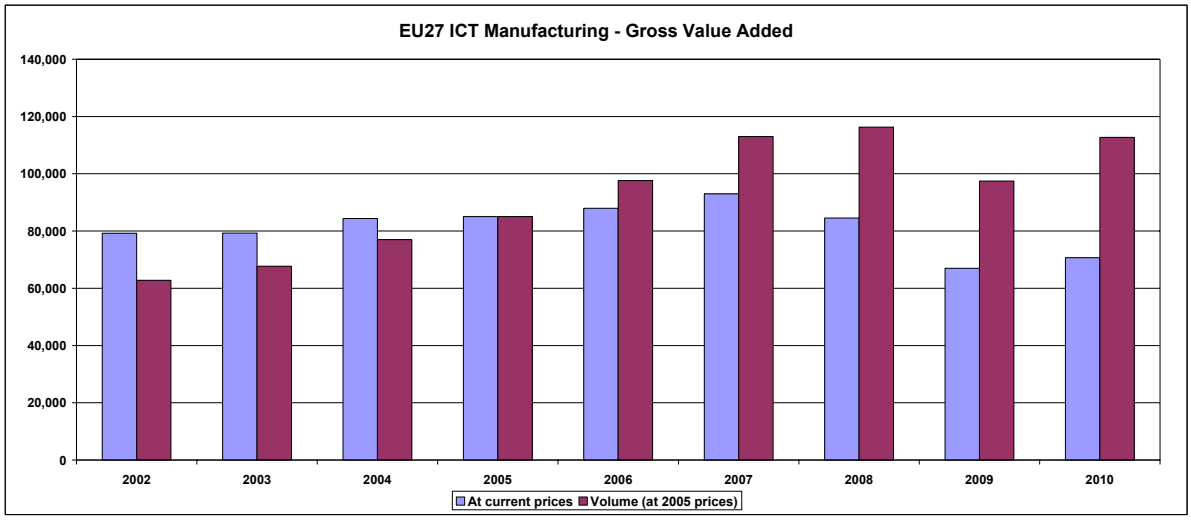
[92] For 2010, Publishing, including software (NACE 58), and Repair of computers (NACE S95) are estimated (extrapolation)

Economic activities in the EU are classified according to NACE Rev. 2, which is the outcome of a major statistical revision which took place between 2000 and 2007 and which reflects the technological developments and structural changes of the economy (see annex 1). For the year 2010, not all data are available at a sufficient level of disaggregation to follow the OECD harmonised definition of ICT activities (see annex 1). In order to cover the recession (2009) as well as the recovery (2010), the classification had to be adapted and some data have to be extrapolated. [93] The following analysis is organised around three main categories of ICT activities: ICT manufacturing, telecommunications, and ICT services other than telecom services.

ICT manufacturing (NACE 26) [94]

The year 2008 had already been a disappointing one for the ICT sector but when the crisis broke out in 2009, the value-added at current prices declined by 21% year-on-year. During the recovery of 2010, value-added increased by 6%, still leaving a 24% gap relative to the peak year of 2007 (Figure 107).

Figure 107: EU 27 - NACE 26 - ICT Manufacturing - Gross Value Added (in millions of €)



Source: Eurostat, national accounts by industry (NACE Rev.2 by 64 braches)

The value-added in volume is higher than at current prices reflecting decreasing prices due to technological progress, particularly in semiconductors (Moore's law). The competitive market

[93] The changes are as follows: (i) an extension of ICT manufacturing activities to optical and magnetic equipment (ii) wholesale and retail trade of ICT are not analysed by lack of data, meaning that the analysis focuses on the production of ICT value rather than on the value created in its distribution (iii) software publishing cannot be separated from the broader division covering all publishing activities (iv) an extension of "repair of computers and communication equipment" to repair of all other household goods.

[94] NACE 26 is broader than ICT activities defined by the OECD and includes the following additional activities:

Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks

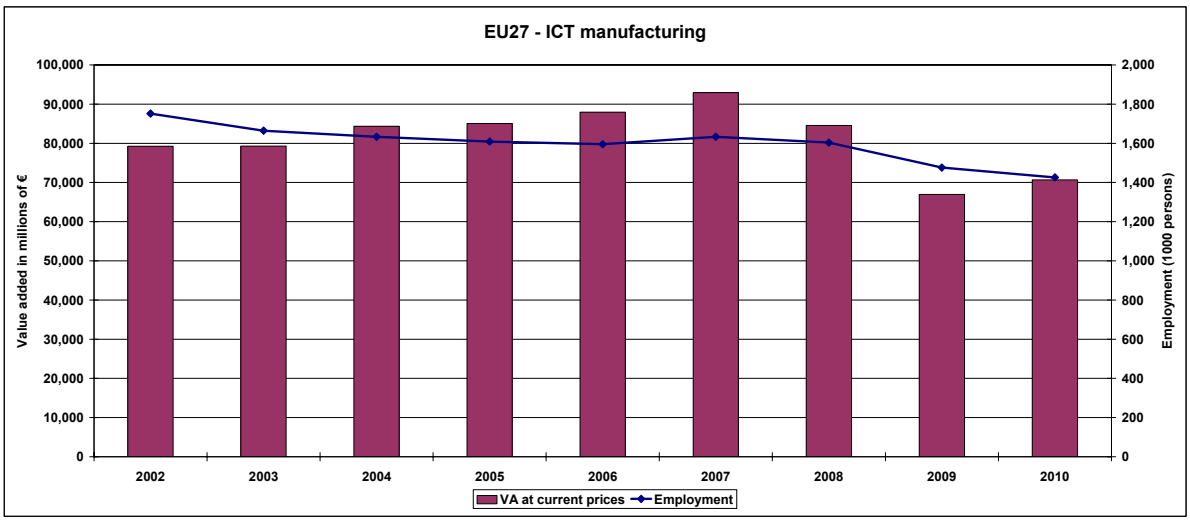
Manufacture of irradiation, electro medical and electrotherapeutic equipment

Manufacture of optical instruments and photographic equipment

structure and global supply chains allowed advanced economies to use cheap labour in developing and emerging countries, additional factors contributing to welfare gains for ICT users.

Employment in ICT manufacturing is more related to technological progress (productivity gains) and international trade (global supply chains) than to the business cycle (Figure 108).

Figure 108: EU 27 - NACE 26 - ICT Manufacturing



Source: Eurostat, national accounts by industry (NACE Rev.2 by 64 braches)

The two main sub-sectors of the European ICT manufacturing industry are microelectronics and telecoms equipment.

Microelectronics

Europe's leadership in semiconductor R&D is undisputed and recognised worldwide. From a commercial point of view, the European industry had nevertheless to specialise in high margin products through divestitures. This reflects a more general trend in favour of lighter asset strategies (lower capital expenditures), in particular by relying on leading-edge foundries' capacities. There is only one European company left in the world's top 10 semiconductor companies (in terms of net sales).

Telecommunication equipment

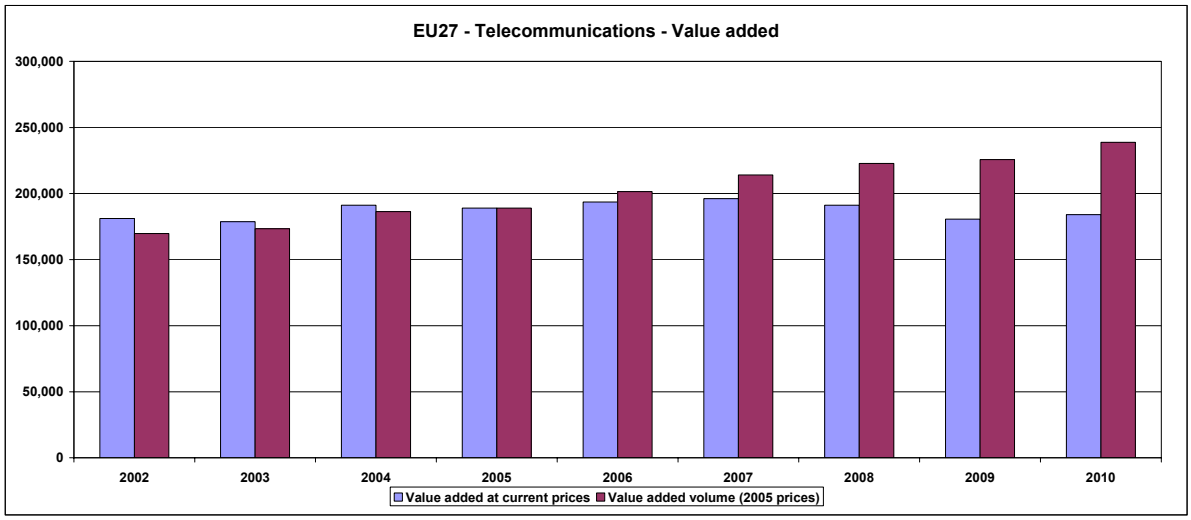
With the rise of smartphones, Europe lost its leadership in mobile devices, while keeping it in networks. The industry suffers from a legacy problem as the end of the deployment of 3G networks has not yet been fully compensated by the deployment of next-generation networks. Competition from Asian entrants such as Huawei and ZTE is also challenging the European market share, although Europe consolidated its position through acquisitions of North American telecom network business units. Nokia Siemens Networks acquired the majority of the wireless network infrastructure assets of Motorola Solutions in the United States while Ericsson acquired the wireless equipment unit of insolvent Nortel Networks Corp in Canada.

Telecommunications (NACE 61)

The years of recession and consequent uncertainties have coincided with one of the most vigorous waves of innovation in telecommunications: the uptake of mobile broadband devices

and services. These add new market opportunities on top of the structural trend of digitalisation of our society. The surge in new devices such as smartphones and tablets, combined with an increasing number of multimedia applications, has led to exponential growth in data traffic volumes and increased spending on wireless and IP networks. The fourth generation wireless network is being adapted faster than expected. Telecoms operators are nevertheless constrained in their capital investments by their operating income given increasing network costs (Figure 109).

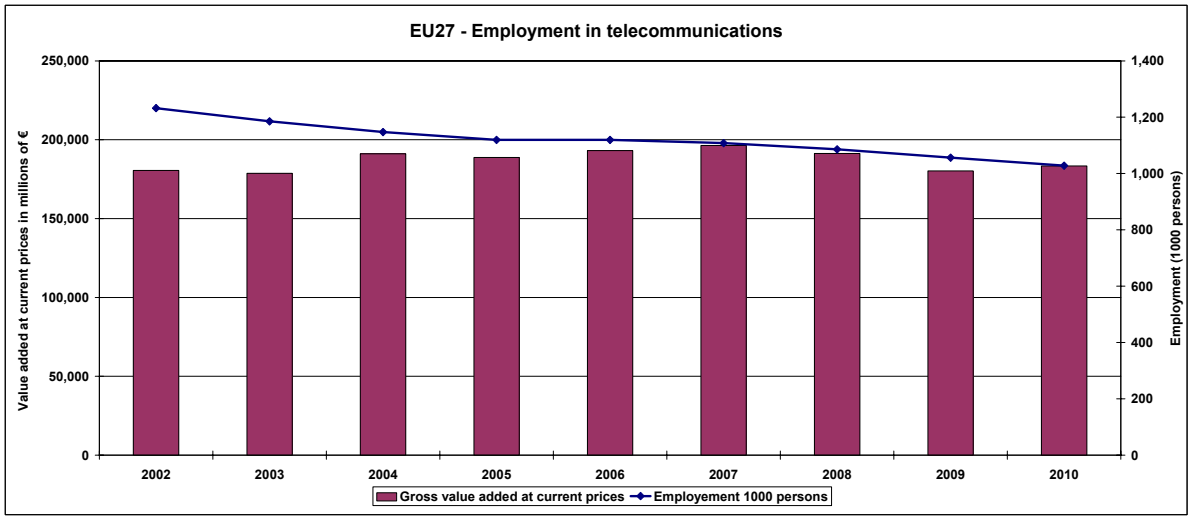
Figure 109: EU 27 - Telecommunications - Value added (in millions of €)



Source: Eurostat, national accounts by industry (NACE Rev.2 by 64 braches)

In 2008 and 2009 the value-added at current prices decreased. It recovered by 2% in 2010 year-on-year. The difference between nominal and real value-added increased significantly over the same years, reflecting regulatory and market pressures on prices. Employment followed structural factors rather than the business cycle (Figure 110).

Figure 110: EU 27 - Telecommunications

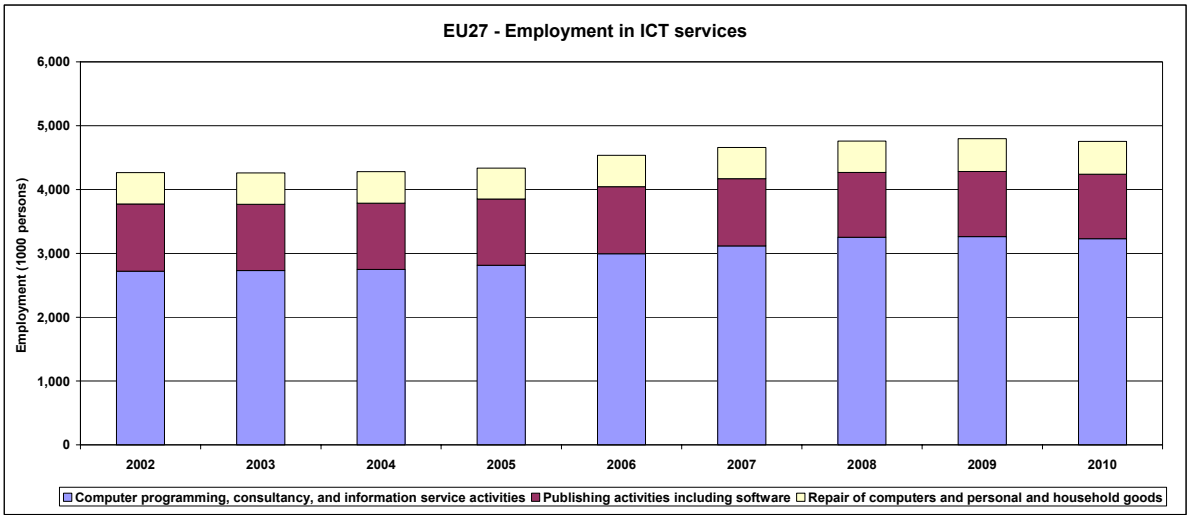


Source: Eurostat, national accounts by industry (NACE Rev.2 by 64 braches)

ICT services excluding telecoms (NACE 58, 62, 63 and 95)

For the EU, out of the 7 million jobs in ICT in 2010, 4.7 million were in ICT services (excluding telecoms). In terms of value-added at current prices, they represented around 50% of the total ICT value-added [95] (Figure 111). In terms of employment and value-added, computer, data processing and web portals services were by far the most important.[96]

Figure 111: EU27 ICT services (excluding telecommunications): Employment (1000 persons)



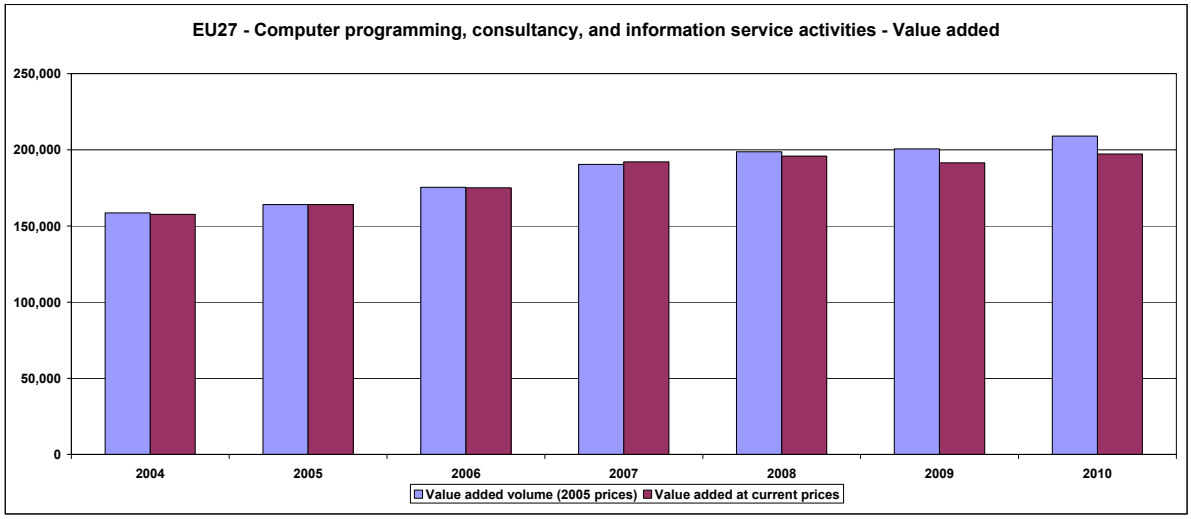
Source: Eurostat, national accounts by industry (NACE Rev.2 by 64 braches). For 2010, NACE 58 and NACE 95 are estimated (extrapolation)

These activities are labour intensive and Figure 112 shows that welfare gains are small when estimated by comparing the nominal and real value-added.

[95] Section 4 analyses the diffusion of ICT in all economic activities and how this implies complementary investments, for example in software. The development of ICT services directly relates to the development of the information and online society.

[96] In order to present data for the EU27, the OECD definition cannot be fully met. NACE 58.2 - Software publishing is not released separately from the whole NACE 58 which includes NACE 58.1 - Publishing of books, periodicals and other publishing activities. As already mentioned, by taking the full NACE 58 activities, the impact of "creative destruction" of the digitalisation of publishing is included in the data. Data is available only for the combined NACE 62 and 63 activities. Data for NACE 95.1 - Repair of computers and communication equipment is not available as such but is included in NACE 95 that also includes repair of all other household goods

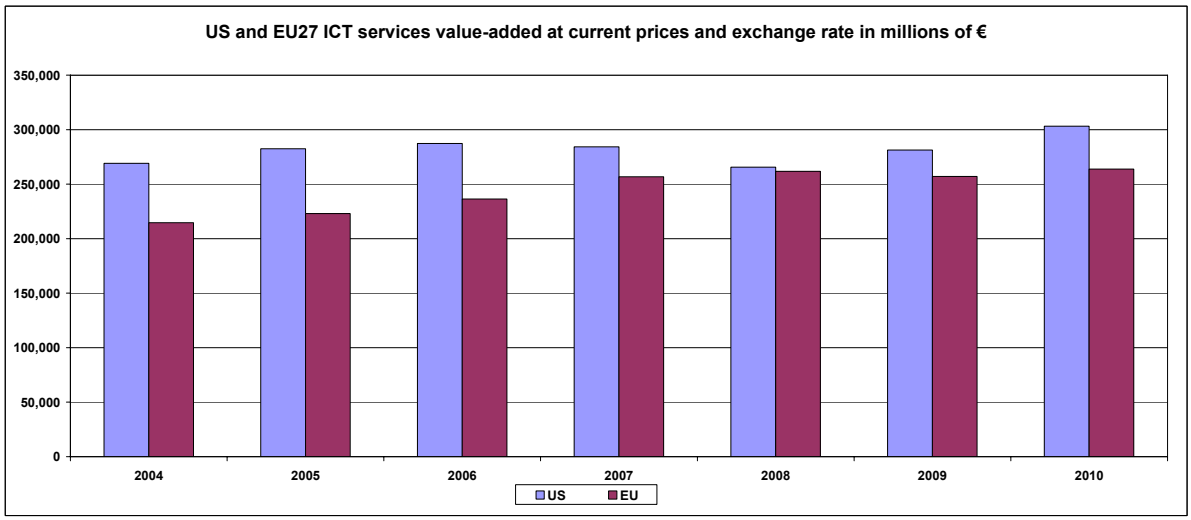
Figure 112: EU27 Computer programming, consultancy, and information service activities – Value-added in millions of €



Source: Eurostat, national accounts by industry (NACE Rev.2 by 64 braches)

ICT services are mainly provided by thousands of small and medium-sized enterprises, mostly competing at national and local level. In 2008, their combined value-added was very similar to the combined value-added of their US counterparts, although the gap has been increasing in recent years (Figure 113).

Figure 113: US and EU27 ICT services value-added at current prices and exchange rate in millions of €



Source: Eurostat, national accounts by industry (NACE Rev.2 by 64 braches)

The size of EU software companies is, in most cases, considerably smaller than that of their US or Japanese counterparts. Europe has only one software company with sales exceeding EUR 10 billion and none that integrates hardware and software. This means that European cloud computing services have to be developed through collaborations with non-European enterprises.

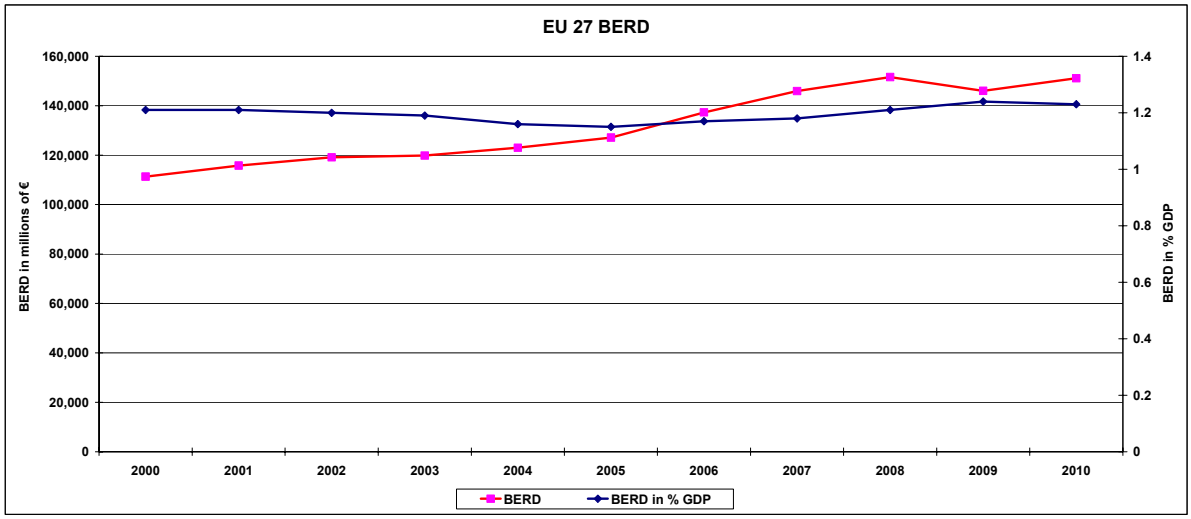
3.2. ICT Research and Development

This section analyses the most recent data available from Eurostat on Business R&D expenditures (BERD) in the European ICT sector (ICT BERD)[97]. ICT BERD is analysed first at the EU level, then at Member State level, and finally at ICT manufacturing and services sub-sector level, including a comparison with the United States.

3.2.1. ICT R&D at EU27 level[98]

In 2009, the EU27's total BERD decreased by 3.7% year-on-year; in 2010, it increased by 3.5%, amounting to EUR 151.1 billion (EUR 151.6 billion in 2008). At the same time, R&D intensity (expressed as a percentage of GDP) increased slightly from 1.21% in 2008 to 1.24% in 2009 and stabilised at 1.23% in 2010 (Figure 114).

Figure 114: EU27 BERD



Source: Eurostat

R&D expenses by the ICT industry alone experienced a similar pattern. In 2009, business ICT sector R&D (BERD) declined by 7.37% (from EUR 27 billion to EUR 25 billion), mostly due to lower spending in ICT manufacturing activities (-16.84%). In ICT services, R&D increased by 2.2%, driven by spending in Computer programming, consultancy and related activities (+5.6%), and Data processing, hosting and web portals (+28%). Meanwhile, R&D spending in telecommunications was stable and decreased in the software publishing sector (-9%).

Since the ICT value-added declined by a similar percentage (7%), from EUR 505 billion to EUR 470 billion, R&D intensity remained almost stable.

With a value-added share in GDP of 4%, ICT drives as much as 17% of total BERD..

---

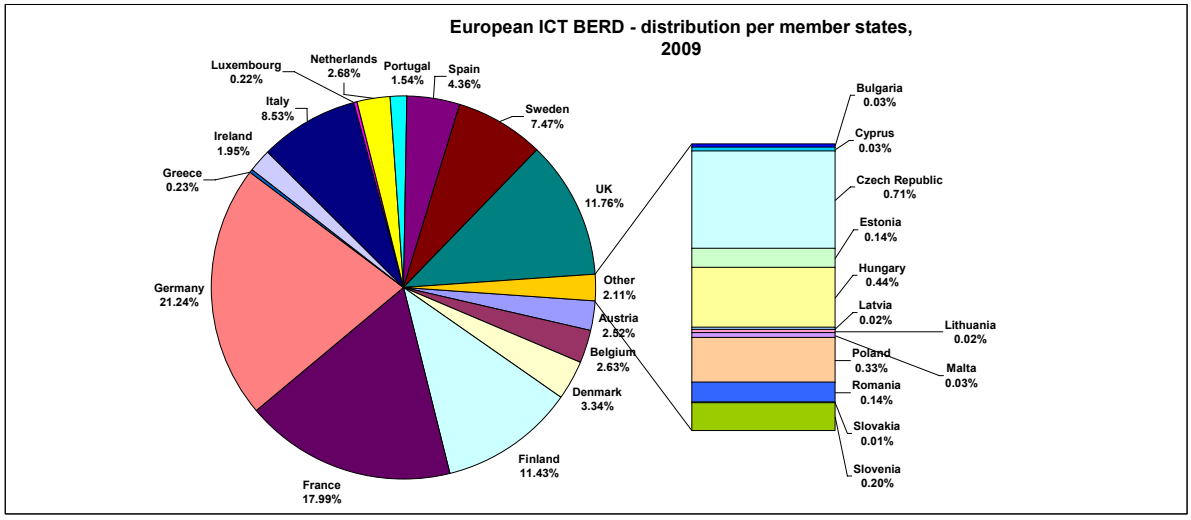
[97] This analysis is based on the most recent definition of the ICT Sector adopted by EUROSTAT and the OECD, according to the NACE Rev. 2 classification. See Annex 1 for more information on this definition.

[98] Most of the data and analysis on ICT R&D come from PREDICT (Prospective Insights on R&D in ICT), a joint project by JRC-IPTS and DG Information Society and Media. For more information see: http://is.jrc.ec.europa.eu/pages/ISG/PREDICT.html

Analysis at Member State level

Six EU countries -- Germany, France, the UK, Finland, Italy and Sweden -- are responsible for almost 80% of total ICT BERD. Half of this is invested in Germany and France. Finland's share of 11.43% of ICT BERD is way above its share in EU GDP (1.5%). The cumulative share of the 12 Member States that most recently joined the EU is 2.11% of the EU ICT BERD; a figure that is still very low (Figure 115).

Figure 115: European ICT BERD distribution by Member State (2009)



Source: Eurostat, JRC-IPTS and IVIE

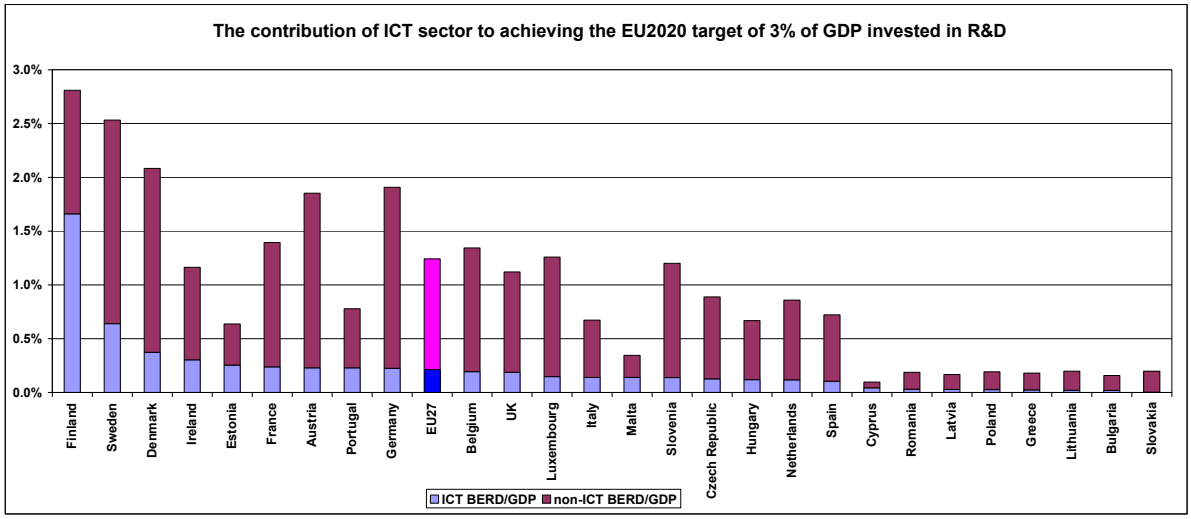
The share of ICT BERD in total BERD reflects both the size of the sector in the economy and the R&D intensity of ICT compared with others. Finland is the EU leader with almost 60% of its BERD invested by the ICT sector (as compared with a share in ICT value-added of 5.3% of GDP). Several of the newer EU Members States are also highly placed in this table (Cyprus, Malta, Estonia), while the three largest EU Members States -- Germany, France and the UK -- have a BERD that is below the EU average. In 2009, eleven Member States had a higher share of ICT BERD in total BERD than they had in 2008.

The Europe 2020 strategy has confirmed the EU objective of investing in R&D the equivalent of 3% of GDP. This includes R&D investments both in the public and the private sector. Considering R&D expenditures in the private sector alone, total EU BERD in 2009 represented 1.24% of GDP, of which 0.21% was contributed by the ICT sector (this is the ratio of ICT BERD in GDP) (Figure 116).

With an ICT BERD of 1.7% of GDP in 2009, Finland had the highest ratio of all EU countries. It also had the highest share of total BERD as a percentage of GDP (2.8%). Apart from Finland and Sweden, all other Member States had a ratio of ICT BERD below 0.5%. "Nokia's impact on Finland's high R&D intensity is significant. When Nokia's R&D activity is deducted from the calculation, Finland's R&D expenditures relative to GDP are 2.4 percent for 2008. However, it must be noted that even this share is well above the EU average."[99]

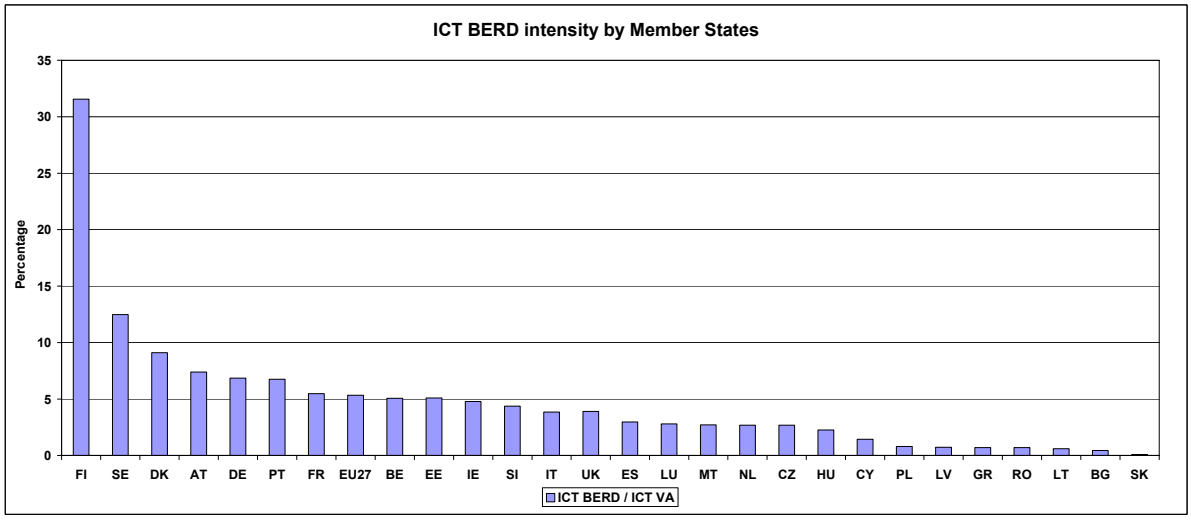
[99] Jyrki Ali-Yrkkö (2010), Nokia and Finland in a Sea of Change: The Role of Nokia in the Finnish Economy

Figure 116: **The contribution of the ICT sector to achieving the EU2020 target of 3% of GDP invested in R&D, 2009**



Source: Eurostat, JRC-IPTS and IVIE

Figure 117



Source: Eurostat, JRC-IPTS and IVIE

The share of ICT BERD in ICT value-added reflects the R&D intensity of the ICT sector of a country or a region. Here again Finland is the leading country in the EU with 2009 ICT BERD intensity above 30%. Finland[100] is followed by Sweden, with ICT BERD intensity above 10%. The average ICT BERD intensity for the EU is 5.3%. 18 EU Member States have an ICT BERD intensity lower than 5%.

[100] Finland's lead in ICT owes not only to the activities of its largest R&D investor, Nokia, but also to ICT R&D performed in a network of traditionally vibrant poles of excellence located, for example, in Tampere, and Espoo Helsinki. G. De Prato, D. Nepelski, Empirical identification and analysis of >European ICT poles of Excellence, JRC IPTS Report (Forthcoming).

3.2.2. Analysis by sector

When considering the EU ICT industry sub-sectors, ICT Manufacturing and ICT Services, each have a similar share of total ICT R&D expenditure. However, they have a very different share of the ICT total value-added. While ICT manufacturing accounts for a relatively small share in total ICT value-added (8% in 2009, down from 11% in 2008), it accounts for 45% of ICT BERD (down from 50% in 2008). ICT services represents 92% of total ICT value-added in 2009 (up from 89% in 2008) and accounted for the remaining 55% of total ICT BERD in 2009.

Table 5 – ICT Value-Added and BERD in the EU by ICT sub-sectors (NACE Rev. 2), 2009

NACE	Description	ICT VA 2009 Mill. euro	ICT BERD 2009, mill. euro
	ICT Total	470 014.74	25 064.34
	ICT manufacturing industries	38 156.54	11 334.33
261	**Manufacture of electronic components and boards**	11 761.75	3 400.72
262	**Manufacture of computers and peripheral equipment**	5 660.69	1 096.92
263	**Manufacture of communication equipment**	16 425.06	6 316.56
264	**Manufacture of consumer electronics**	4 231.43	514.38
268	**Manufacture of magnetic and optical media**	77.61	5.75
	ICT total services	431 858.20	13 730.01
	ICT trade industries	42 472.72	503.94
4 651	**Wholesale of computers, computer peripheral equipment and software**	28 046.12	na
4 652	**Wholesale of electronic and telecommunications equipment and parts**	14 426.60	na
	ICT services industries	389 385.48	13 226.06
5 820	**Software publishing**	11 340.47	999.20
61	**Telecommunications**	180 246.50	4 322.72
62	**Computer programming, consultancy and related activities**	165 809.85	7 526.66
631	**Data processing, hosting and related activities; web portals**	20 868.30	362.12
951	**Repair of computers and communication equipment**	11 120.36	15.36

Source: Eurostat, JRC-IPTS and IVIE

3.2.3. Comparison with the US

In 2009 the EU ICT sector's value added amounted to EUR 416,422 million while in the United States in amounted to EUR 510,472 million[101]. This comparison excludes the ICT Trade and Repair sub-sectors since data on value-added and BERD in these sub-sectors were not available for the United States,

ICT BERD was respectively EUR 24,545 million for the EU and EUR 62,680 million for the US. Therefore, the US ICT BERD intensity (measured by the share of ICT BERD in ICT value-added) was twice that of the EU (12% vs. 6%), and was higher than in any EU country with the exception of Finland.

R&D intensity is sector specific; it is much higher in ICT manufacturing than in ICT services. The higher ICT BERD intensity in the United States can be partly explained by the fact that in 2009, the share of ICT manufacturing in total ICT value-added was more than double that of the EU (18% in the United States compared with 8% in the EU).

Among the ICT manufacturing subsectors, there were also differences in size and intensity. The Telecommunications equipment sector represented a similar share of value-added in the EU as it did in the United States (4%). But in terms of BERD, the share of this sub-sector was higher in the EU (26%) than in the United States (15%). Both the Electronic components and boards, and Computers and peripheral equipment ICT sectors had, however, higher value-added and higher BERD shares in the United States than in the EU.

In ICT services, the Telecommunication sector represented similar shares of ICT value-added in the EU as in the United States (43% in the EU and 40% in the United States). Its share of BERD was however much higher in the EU (18%) than in the United States (2%). The Computer programming, consultancy and related activities sector had higher shares of value added (40%) and BERD (31%) in the EU than in the United States (24% value-added and 14.5% of ICT BERD). Meanwhile., the Software publishing sector was responsible for 10.5% of US ICT value-added and as much as 30% of US ICT BERD while in the EU the corresponding figures were 2.7% and 4.1%.

3.3. ICT diffusion, innovation and economic growth [102]

3.3.1. ICT investment

Economic value is created by combining labour and capital, which includes any possible piece of equipment in terms of plant, vehicles, and buildings.[103] The 1990s saw the share of ICT in the aggregate capital stock increase in virtually all economies and with such intensity

[101] These two sub-sectors perform very little R&D, although together they produced 11% of the total ICT sector value-added in 2009. Please also note that in order to stick to the OECD definition of ICT activities, the value-added considered in this section is narrower than in section 1.2.1 which included all publishing activities (and not just software publishing), motion picture, video, television and broadcasting programme activities

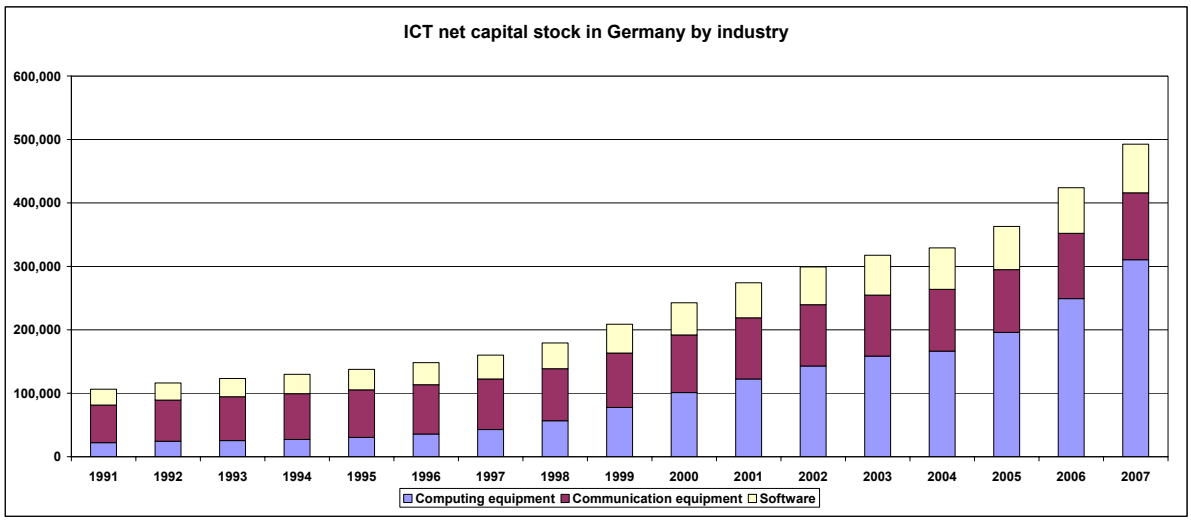
[102] For an in-depth analysis, please refer to the ICTNET website, a FP 7 funded coordination action to support research in the economics of ICT. - http://www.ict-net.eu/

[103] The capital stock is the sum over time of the annual flow of investment (gross fixed capital formation), adjusted by the depreciation rate of the different equipments (perpetual inventory method).

that ICT capital deepening became a major source of productivity growth. In Europe, in the period 1995-2000, productivity increased at a rate of 1.43%. Capital contribution was 0.71% of which ICT capital contributed 0.37%[104].

Figure 118 illustrates the proportion of ICT equipment in the capital stock by industry for Germany. This trend was reflected across most countries[105]

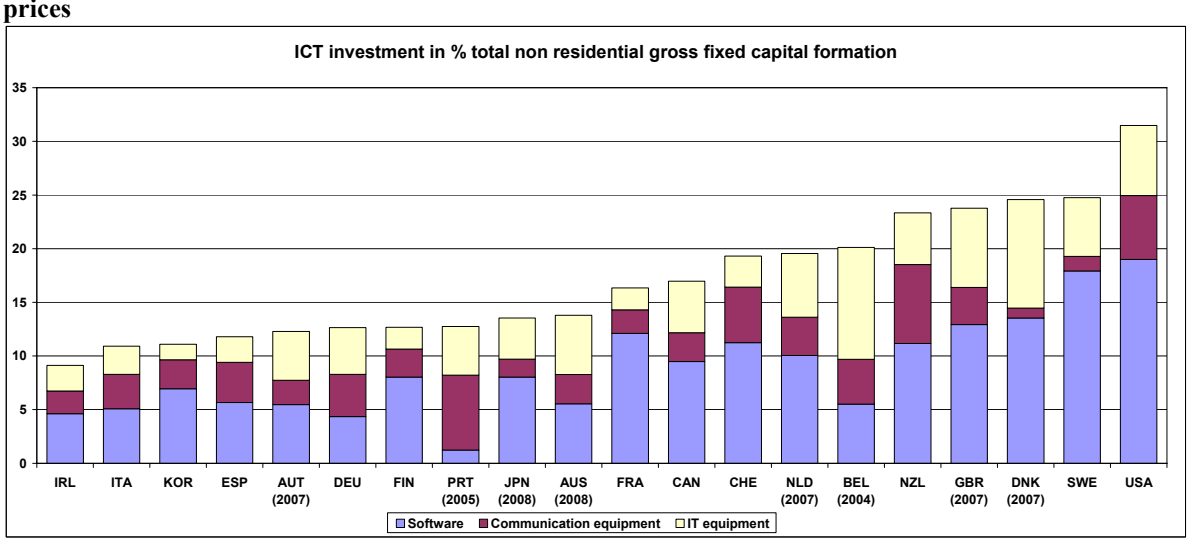
Figure 118: ICT net capital stock in Germany by industry in millions of 1995 chained €



Source: EU KLEMS

Enterprises are still devoting a significant part of their investments to the ICT platform. In 2007-09, it represented over 30% in the United States, about 25% in Sweden and Denmark, and over 20% in the United Kingdom (Figure 119).

Figure 119: ICT investment in % total non residential gross fixed capital formation (2009) at current prices



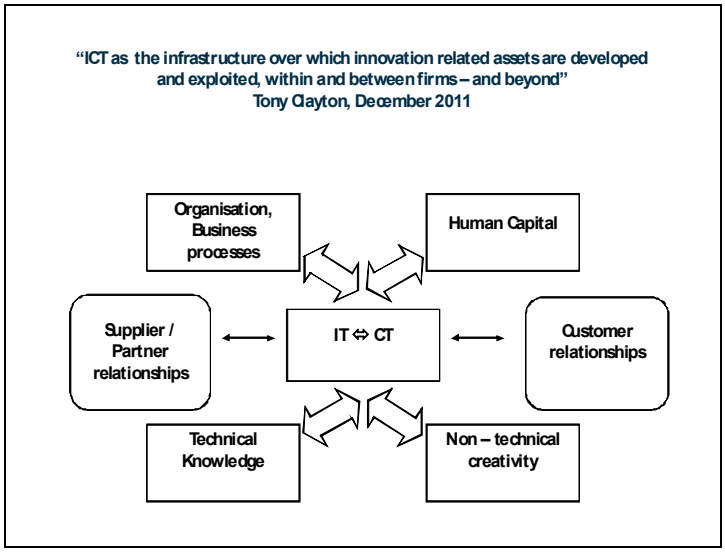
Source: OECD Science, Technology and Industry Scoreboard 2011

[104] source EU KLEMS
[105] EU KLEMS database provides the net capital stock only for a few countries, due to confidentiality.

3.3.2. Investment in intangible assets

The successful adoption and use of ICT by businesses requires complementary investments. From the design of a website to electronic exchanges with suppliers and customers, each enterprise and institution has to "rethink and reshape" its organisation in a context that is far more competitive due to easier and costless access to information on products and suppliers (Figure 120).

Figure 120: ICT innovation platform



Source: Tony Clayton (2011) [106]

As part of the increasing interest for these complementary investments (defined in as investment in intangibles), ICT has received special attention for at least three reasons: first, computerised information (software and databases) accounts for a significant proportion of total intangibles; second, successful adoption and use of ICT by businesses requires complementary investments in intangibles, like training, management and organisation; finally, ICT itself raises the economic value of information. The data gathered on the purchase preferences of e-customers has become a business asset for on-line retailers[107].

ICT has the potential to increase innovation by speeding up the diffusion of information. It favours networking among firms, enables closer links between businesses and customers, reduces geographic limitations, and increases efficiency in communication. A recent survey from the Dutch statistical office (CBS) confirms the importance of ICT for innovation (table 6) [108].

Table 6 – ICT and innovation

In % of enterprises having innovated in 2009

[106] http://ec.europa.eu/research/social-sciences/events-197_en.html

[107] For a more detailed analysis, please refer to the ICTNET Assessment Paper 3 ICT R&D and Intangibles https://community.oecd.org/docs/DOC-38254

[108] For more, please refer to the ICTNET Assessment Paper 2 on ICT-enabled innovation https://community.oecd.org/docs/DOC-31259 and for a survey, Brynjolfsson, Hitt and Yang (2002) http://oz.stern.nyu.edu/cite05/readings/brynjolfsson3.pdf

ICT for product innovation	
Very important	**33**
Important	**32**
Somewhat important	19
Not important	15
ICT for process innovation	
Very important	**42**
Important	**43**
Somewhat important	12
Not important	4
ICT for organisational innovation	
Very important	**23**
Important	**41**
Somewhat important	24
Not important	13
ICT For marketing innovation	
Very important	**24**
Important	**44**
Somewhat important	24
Not important	7

Source: Statistics Netherlands - CBS

Two projects funded by the European Commission (COINVEST[109] and INNODRIVE[110]) under the 7th Framework Program pioneered the provision of intangible investment databases. Intangible investments have been classified[111] according to three main categories:

- Computerised information

[109] www.coinvest.org.uk

[110] www.innodrive.org/

[111] According the seminal paper of Corrado, Hulten and Sichel (2005, 2009)

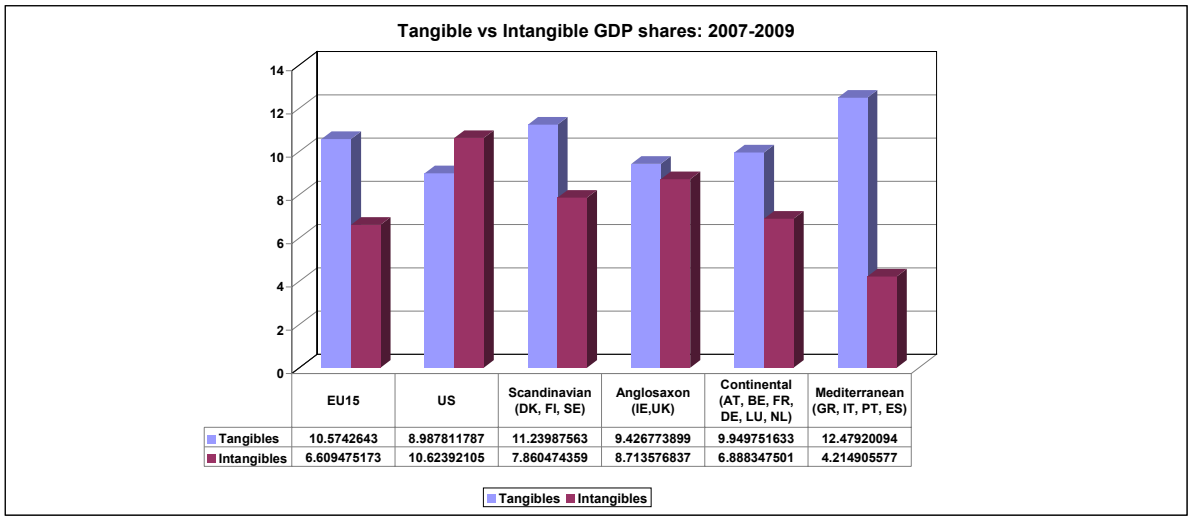
Software
Databases

- Technical and non-technical innovative property (R&D expenses)
- Economic competences

Organisational capital
Firm specific human capital (e.g. vocational and apprentice training)
Brand equity (e.g. advertising, market research)

The most recent results[112] show that the share of intangibles in GDP from 1995 to 2009 (average values) amounted to 6.6% in the EU15 and to 10.6% in the United States, which compares with a tangibles share of 10.6% in the EU15 and 9% in the United States (Figure 121)

Figure 121: Tangible vs Intangible GDP shares: 2007-2009

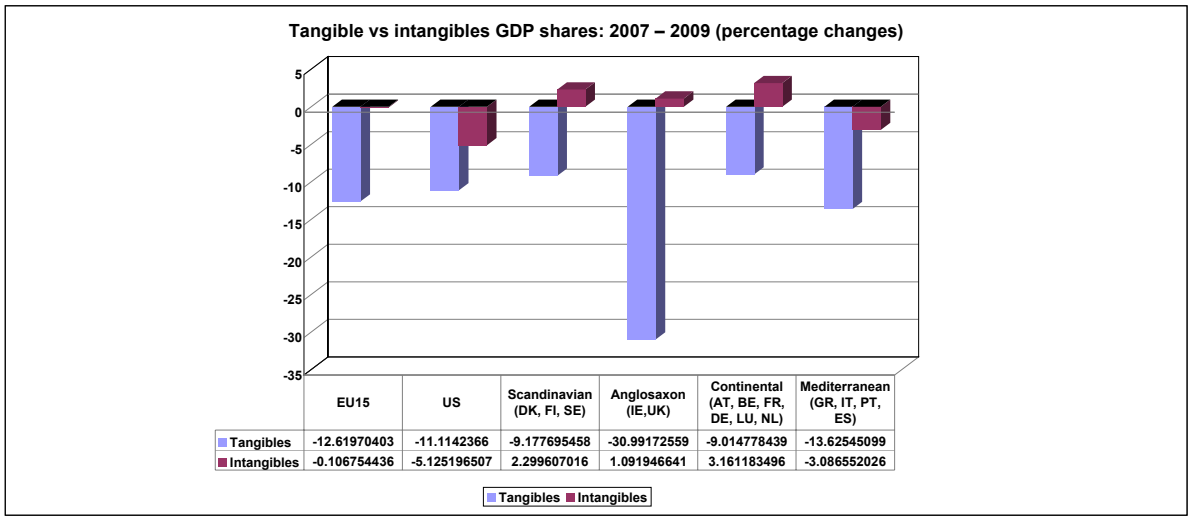


Source: Carol Corrado (The Conference Board), Jonathan Haskel (Imperial College), Cecilia Jona-Lasinio and Massimiliano Iommi (ISTAT and LLEE), ICTNET Workshop, April 2012

The rate of tangible investment in the EU15 declined sharply from 2007 to 2009 while the rate of intangible investment remained fairly flat. In the United States, intangible investment fell (Figure 122).

[112] Please refer to the ICTNET website and to the following paper: Carol Corrado, The Conference Board, New York, Jonathan Haskel, Imperial College, London, Cecilia Jona-Lasinio, ISTAT and LLEE, Rome, Massimiliano Iommi, ISTAT and LLEE, Rome, (2011,2012), Intangible Capital and Growth Strategies for Advanced Economies:Measurement Methods and Comparative Results

Figure 122: Tangible vs intangibles GDP shares: 2007 – 2009 (percentage changes)



	EU15	US	Scandinavian (DK, FI, SE)	Anglosaxon (IE,UK)	Continental (AT, BE, FR, DE, LU, NL)	Mediterranean (GR, IT, PT, ES)
Tangibles	-12.61970403	-11.1142366	-9.177695458	-30.99172559	-9.014778439	-13.62545099
Intangibles	-0.106754436	-5.125196507	2.299607016	1.091946641	3.161183496	-3.086552026

Source: Carol Corrado (The Conference Board), Jonathan Haskel (Imperial College), Cecilia Jona-Lasinio and Massimiliano Iommi (ISTAT and LLEE), ICTNET Workshop, April 2012

3.3.3. Conclusions

Between 1995 and 2008, capital deepening in intangible capital made an average 25% contribution to labour productivity[113]. The share of personnel engaged in intangible capital type work is comparable in six European countries, accounting for about 18% of all workers[114]. Hence ICT continues to have an impact on economic performance as its use spreads across all sectors of the economy.

But the ICT producing sector also continues to be a source of growth, despite the changes brought about by the technological waves. Recent technological changes, new markets, and company strategies are generating growing and broader interdependencies between telecom services, equipment industries, and related industries such as software publishing and internet service providers.

These new interdependencies between the ICT sub-sectors, together with increased competition between them, are affecting the overall ICT sector R&D landscape worldwide and are changing the way in which we need to consider R&D intensity. A deeper analysis is needed that goes beyond the boundaries of individual ICT sub-sectors or even of the ICT sector to include other sectors of the digital economy (for example, media and contents)[115].

[113] Carol Corrado, Jonathan Haskel, Cecilia Jona-Lasinio, and Massimiliano Iommi, http://ec.europaipv4.eu/research/social-sciences/pdf/events-197/carol-corrado_en.pdf

[114] According Innodrive

[115] See European Commission JRC-IPTS report on The Top World R&D-investing Companies from the ICT Sector: A Company-level Analysis, Daniel Nepelski, Juraj Stancik EUR 24841 EN, 6/2011; available at http://is.jrc.ec.europa.eu/pages/ISG/PREDICT.html

3.3.4. Annex

For detailed information on changes introduced by the NACE Rev. 2 definitions, see Eurostat http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-RA-07-015/EN/KS-RA-07-015-EN.PDF

For detailed information on changes in coverage of ICT activities introduced by the NACE Rev. 2 definitions, see the OECD *Guide to Measuring the Information Society 2011*, in particular, Annex 7 A1, pp 149-165: http://www.oecd-ilibrary.org/science-and-technology/oecd-guide-to-measuring-the-information-society-2011_9789264113541-en; or OECD document DSTI/ICCP/IIS(2006)2/FINAL of 05 March 2007: http://www.oecd.org/dataoecd/49/17/38217340.pdf

ICT in NACE Rev.2

NACE Rev. 2 code	**Description**
261	Manufacture of electronic components and boards
262	Manufacture of computers and peripheral equipment
263	Manufacture of communication equipment
264	Manufacture of consumer electronics
268	Manufacture of magnetic and optical media
4651	Wholesale of computers, computer peripheral equipment and software
4652	Wholesale of electronic and telecommunications equipment and parts
5820	Software publishing
61	
6110	Wired telecommunications activities
6120	Wireless telecommunications activities
6130	Satellite telecommunications activities
6190	Other telecommunications activities
62	
6201	Computer programming activities
6202	Computer consultancy activities

63	
6203	Computer facilities management activities
6209	Other information technology and computer service activities
6311	Data processing, hosting and related activities
6312	Web portals
9511	Repair of computers and peripheral equipment
9512	Repair of communication equipment

Harmonising US and EU ICT activities

US (BEA)	EU (Eurostat)
ICT manufacturing	ICT manufacturing
Computer and electronic products	NACE 26 Manufacture of computer, electronic and optical products
Information services	ICT services
Motion picture and sound recording industries	NACE 59_60 **Motion picture, video, television programme production; programming and broadcasting activities**
Publishing industries, including software	NACE 58 Publishing including software
Broadcasting and telecommunications	NACE 61 Telecommunications
Information and data processing services	NACE 63 Data processing, hosting and related activities; web portals
Computer systems design and related services	NACE 62 Computer programming, consultancy and related activities

4. DIGITAL COMPETENCES IN THE DIGITAL AGENDA

- In 2011, 73% of EU 27 households had access to the internet, a 3 percentage point. increase over 2010.

- A lack of skills is the second most important reason for not having access to the internet (after lack of interest) and it has increased in importance compared to 2008 by 9 percentage points. From a cross-country perspective, more than 1 out of 2 households without internet access in Cyprus, Estonia, Latvia, Portugal, Slovenia, and Slovakia reported a lack of skills as a reason for not having internet access at home.

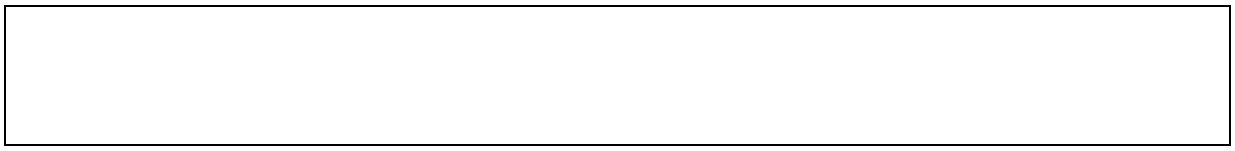
- In terms of different levels of digital skills, on average 14% of Europeans have low level computer skills, 25% have medium level skills and 27% have high level skills. At the same time, 30% of Europeans have low level internet skills, 32% have medium level skills and 11% have high level skills. These figures have not changed significantly over the past 2 years, increasing by only 2 percentage points.

- Countries with a higher rate of regular and frequent computer or internet users tend to have a higher rate of medium and high-skilled people.

- Only 1 out of 3 students in Europe are taught by teachers for whom participation in ICT training is compulsory.

- Only 53% of the labour force said is confident that their level of computer and/or internet skills are sufficient if they were to look for a job or change job within a year. The Nordic countries, the Netherlands and the UK have levels of confidence in skills at or above 70%..

- Age, gender, and education remain the key challenges. Older people as well as those with lower levels of education tend to have lower level digital skills and the same is true for women in comparison to men. As a result, 'skilling up' European citizens requires a set of specific strategies that will address age, educational and gender gaps.



Information and Communication Technologies (ICT), in their various forms, permeate our lives from our youngest years. We learn and use ICT in school and it supports life-long learning. In the work place, these technologieshave spread so rapidly that it is estimated that by 2015, 90% of jobs will require at least a basic level of digital skills. We also use ICT in our private lives for leisure, entertainment, to communicate with others and to participate in the civil society. As such, we have contact with ICT every day, or almost every day, and, in fact, we are required to build the necessary skills to be able to use them effectively.

Until not so long ago an individual's essential set of skills comprised the so-called 3 R's: reading, writing and arithmetic. In view of today's digital transformation this is no longer sufficient. For individuals to benefit from the Information Society, as well as to respond to its challenges, they must enhance their set of skills to include *Digital Skills.*

Digital skills are the basis of *Digital Competence*, "*the confident and critical use of information Society technology (IST) for work, leisure, learning and communication".*

Furthermore, to reap the benefits of ICT for growth and employment, ensuring the adequate availability of skills is essential. Academic research shows that to make the most of the productivity and growth potential of ICT, investment in human capital is central. In particular, investment in digital competences plays an important role. Countries that have invested in digital competences, alongside their ICT investments, have seen and benefited from a larger impact on productivity and growth.

Looking to the future, ICT continues to be a growth sector due to the development and roll-out of new ICT innovations such as cloud computing, 'smart' applications, and green ICT (including "smart" infrastructures to increase energy efficiency). To achieve the growth potential of these technologies we must equip our workforce with the adequate skills, especially since the emergence and rapid development of new technologies could lead to significant skill shortages and mismatches. Forecasts suggest that by 2015, there may be as many as 700 000 unfilled job vacancies in the area of ICT. Indeed there is a declining interest of young people in ICT careers, despite the sector's good career prospects and the recent historically high youth unemployment rates. Recent statistics show that although the number of ICT graduates increased from 71,000 per year in 2000 to 127,000 in 2006, it decreased in the following years, dropping to 114,000 by 2009.

The importance of digital competence was recognised by the European Parliament and the European Council in 2006 in their recommendation on key competences for lifelong learning. The recommendation identified digital competence as one of eight key competences essential for all individuals in a knowledge-based society[116]. Since then the European Commission has undertaken a number of initiatives recognising the importance of ICT. As a result, one of the pillars of the Digital Agenda for Europe (DAE) is devoted to digital literacy/competence, skills and inclusion, with a number of actions in this area.

The purpose of this chapter is to present up-to-date evidence on levels of digital competence in Europe (for convenience an overview of the conceptual framework that was developed one year ago is reproduced in Box 1 below). Additionally, the chapter explores the socio-economic variables that are associated with the computer and internet skill level of

[116] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:394:0010:0018:en:PDF

individuals; namely age, gender, educational level, employment status, household income, citizenship and type of locality. Finally, the chapter provides new evidence on the use of ICT in education, including on the digital competence of students and teachers, gained from the study "*Survey of Schools: ICT in Education*"[117]. The latter is funded by the European Commission Directorate General Information Society and Media and is being undertaken by European Schoolnet and the Service d"Approches Quantitatives des Faits Educatifs in the Department of Education of the University of Liège. It aims to benchmark progress in ICT availability and its use in 31 countries (EU27, Iceland, Norway, Croatia and Turkey) by surveying students, head teachers and teachers. Hence, it will contribute to the development of up-to-date and relevant indicators and to the establishment of a continuous monitoring system on ICT access, use and impact in schools.

All data in this chapter are sourced from *Eurostat's Community Survey on ICT Usage in Households and by Individuals*, except for the data presented in the section "ICT in education" that are sourced from the *Survey of Schools: ICT in Education*.

[117] The Survey of Schools: ICT in Education, SMART 2010/0039 is still ongoing and the results presented here are preliminary and based in the draft final report. The final report is expected during the summer 2012.

Box 1: A Conceptual framework for Digital Competence

The conceptual framework that is used in this chapter is the one developed in the Digital Agenda Scoreboard 2011, chapter 6, p. 5 and is reproduced here (table 7).

Table 7: Conceptual framework for digital competence

Environmental factors	(1) Access to ICT	•Computers •Internet •Mobile devices •Etc
Individual competence		(2) Operational skills
	•Basic computers skills	
		•Basic internet skills
	(3) Active application to aspects	
	•Work/professional	of life •Learning (LLL)
		•Communication •Participation in society •Leisure •Collaborative networking
Personal attitudes	(4) Personal attitudes	•Critical/reflective use •Responsible use •Legal and ethical principles •Confident use •Creative use

4.1. Recent evidence on digital competence in Europe

4.1.1. Access to ICT

The first step for an individual to become digitally competent is to have access to ICT. Access to ICT comprises access to a computer and the internet but also to other more recently developed devices that rapid technological developments have made available such as laptops, smart phones, tablet PCs, games consoles, PDAs and digital television. Access to the

internet is so important that according to a United Nations Report it should be a human right and *a priority for all states given that the internet has become an indispensable tool for realizing a range of human rights, combating inequality, and accelerating development and human progress*[118]. Indeed, in some countries, such as Estonia, Finland, France, Greece and Spain internet access has already been made a human right.

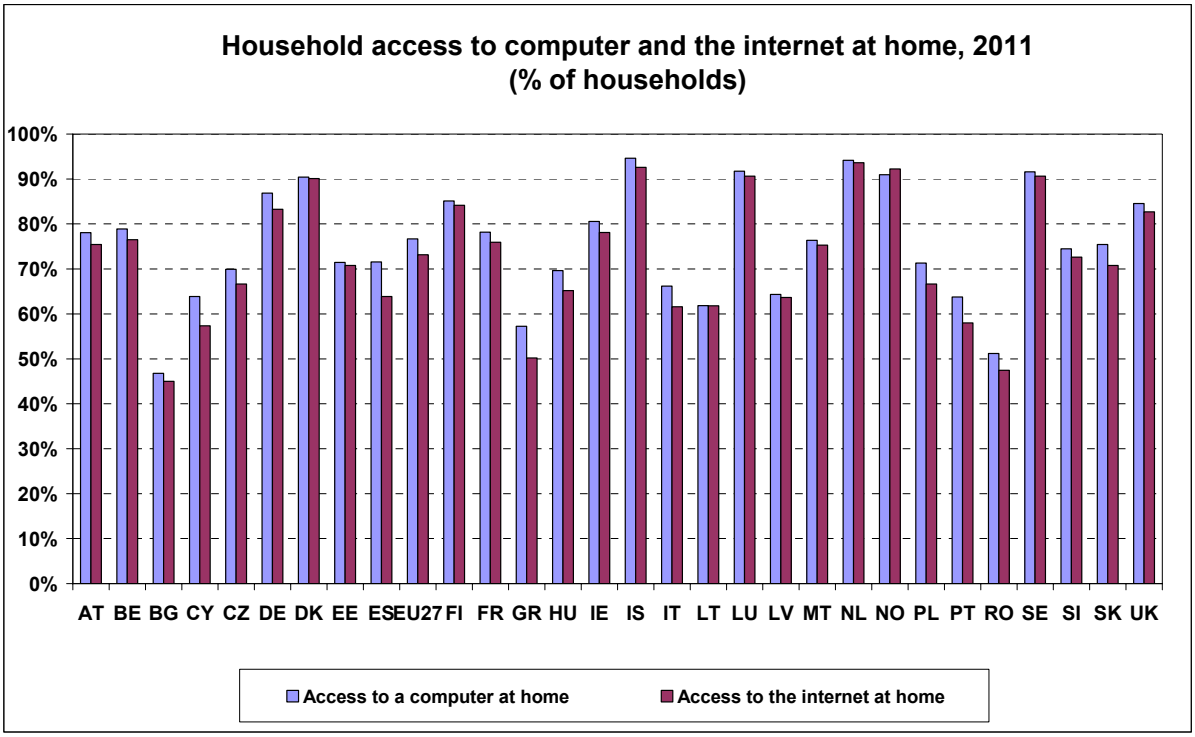
⇒ 3 out of 4 European households have access to the internet…

On average in the EU27, 77% of households[119] had **access to a computer at home** in 2011, a 3 percentage point increase since 2010, while 73% of EU households had **access to the internet**, also a 3 percentage point increase over 2010.

The highest rates for both indicators were observed in Denmark, Iceland, the Netherlands, Norway, Luxemburg and Sweden (around 90% or above).

The lowest rates were observed in Greece, Romania, and Bulgaria (close to 50% or below) (Figure 123).

Figure 123



Source: Eurostat

⇒ …but 38 million households are not yet online

Progress continues to be made, as evidenced by an increase in access levels across all EU Member States (MS). Only two Member States still have access rates below 50% (Bulgaria and Romania), although,

[118] Report of the Special Rapporteur on the promotion and protection of the right to freedom of opinion and expression, Frank La Rue, General Assembly, 16 May 2011

[119] Households with at least one member aged 16-74 years

remarkably, Bulgaria, has increased its rates of access very substantially in 2011 by 33% and 35% reaching 47% and 45% in computer and internet access respectively.

Nevertheless, access is only the pre-requisite for digital competence and there are still almost 1 out of 4 households without it.

As for infrastructure, 67% of European households reported that they had access to the internet **via broadband at home** in 2011, up from 61% in 2010 and 57% in 2009.

Among **mobile devices to access the internet,** smartphones and portable computers (laptops) are equally popular, with 30% of EU27 citizens using either of them to access the internet away from home or at work in 2011. The use of smart phones is becoming popular given that 19% of EU individuals[120] already use them to access the internet, In some countries rates have reached more than 30% (Denmark, Finland, Luxembourg, the Netherlands, Norway, Sweden and the UK) showing that these countries not only have higher rates of access to the internet but also use a larger variety of devices for doing so. Nevertheless, these forms of access still represent a minority and are often used in addition rather than to replace more traditional forms of access.

⇒ **… So millions of households in Europe do not go online. Why?**

1. **Lack of interest (45%)**
2. **Lack of skills (33%)**
3. **Equipment costs (26%)**
4. **Access costs (23%)**

For households *without access to the internet*, the most important **reason for not having internet access** at home was a lack of interest (45% of households with no internet access). The next most important factors were a lack of skills (33%) and cost factors (32%):equipment costs (26%) and access costs (23%).

An expressed lack of interest could relate to a number of things: lack of knowledge and skills, a genuine lack of interest, lack of an appropriate offer or not wanting to report financial reasons. Most reasons have remained fairly stable or decreased in importance over time given that the percentage of households that have no access to the internet has also decreased (Figure 124[121]).

In 2011 rates of households *without access to the internet*, reporting that lack of skills is a reason for no internet access at home, were very high in a number of countries: Cyprus (64%), Estonia (66%), Latvia (57%), Portugal (69%), Slovenia (63%), and Slovakia (49%). Access and equipment costs were considered particularly important in Belgium, Estonia, France, Hungary, Latvia, Malta, Poland, Portugal, Romania, and Slovenia. In fact, on average, 32% of Europeans reported that equipment or access costs were a hindering factor in accessing the

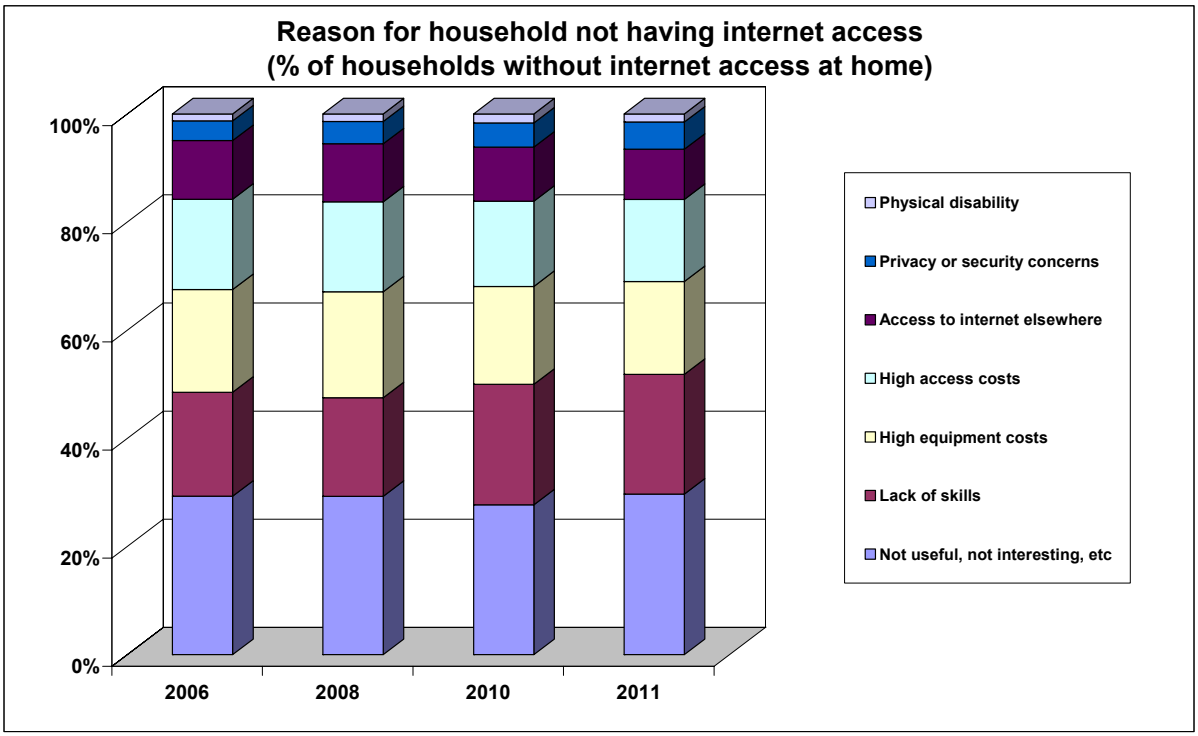
[120] Individuals aged 16-74 years

[121] Data for broadband are available only for 2011 (3%)

internet and 18% of them stated that both of those aspects were significant as reasons. Only 14 % reported that they do not have access at home because they have it elsewhere, although this seems to be an important factor in Latvia (32%). Another 3% reported that broadband was not available in their area, 8% said they did not want accessdue to privacy and security concerns, and 2% due to a physical disability. Therefore, more needs to be done to overcome cost and skills barriers as well as to get behind the reasons for a lack of interest.

Lack of skills has become a relatively more important factor as a barrier to internet access: Skills has increased by 6 percentage points. between 2006 and 2011 as a reason for not having access. Lack of interest has also become relatively more important (4 percentage points increase). By the same token, high equipment costs and high access costs as reasons have remained virtually unchanged. Nevertheless, in absolute terms, the number of households not having access declined by 23 percentage points and all other factors have also declined in absolute terms.

Figure 124



Source: Eurostat

4.1.2. Operational Computer and Internet skills

operational computer and internet skills form the form the basis for the functional use of ICT, particularly of computers and the internet. However, in view of rapid technological progress and the growing number of ICT devices, it may be necessary in future to consider an enhanced skills basket.

ICT skills are measured every year in the Eurostat Community Survey on ICT usage on the basis of a set of questions related to the respondents uses of computers and the internet (see Box 2 for a detailed description).

Box 2: The skills index

The Eurostat Community Survey on ICT Usage asks questions related to either 6 different internet or computer related skills. Individuals who have performed 1 or 2 of these tasks are considered to be low skilled; those with 3-4 are medium skilled and those with 5-6 are high skilled.

The computer skills included are the percentages of individuals who have:

- copied or moved a file or folder
- used copy and paste tools to duplicate or move information within a document
- used basic arithmetic formulas in a spreadsheet
- compressed (or zipped) files
- connected and installed new devices, e.g. a modem
- and, wrote a computer program using a specialized programming language

The internet skills included are the percentages of individuals who have:

- used a search engine to find information;
- sent an email with attached files;
- posted messages to chat rooms, newsgroups, or an online discussion forum;
- used the internet to make a phone call;
- used peer-to-peer file sharing;
- and, created a web page.

As this year's survey contained a special module on ICT skills, this year the survey also contained questions for both internet and computer related skills. Instead of the usual 6 questions on either computer or internet related activities, this year there were 10 computer related activities and 8 internet related activities. The extra questions relate to:
Extra computer-related activities

- Transferring files between computer and other devices
- Modifying or verifying the configuration parameters of software applications
- Creating electronic presentations with presentation software (e.g. slides)
- Installing a new or replacing an old operating system

Extra internet-related activities

- Uploading text, games, images, films or music to websites
- Modifying the security settings of internet browsers

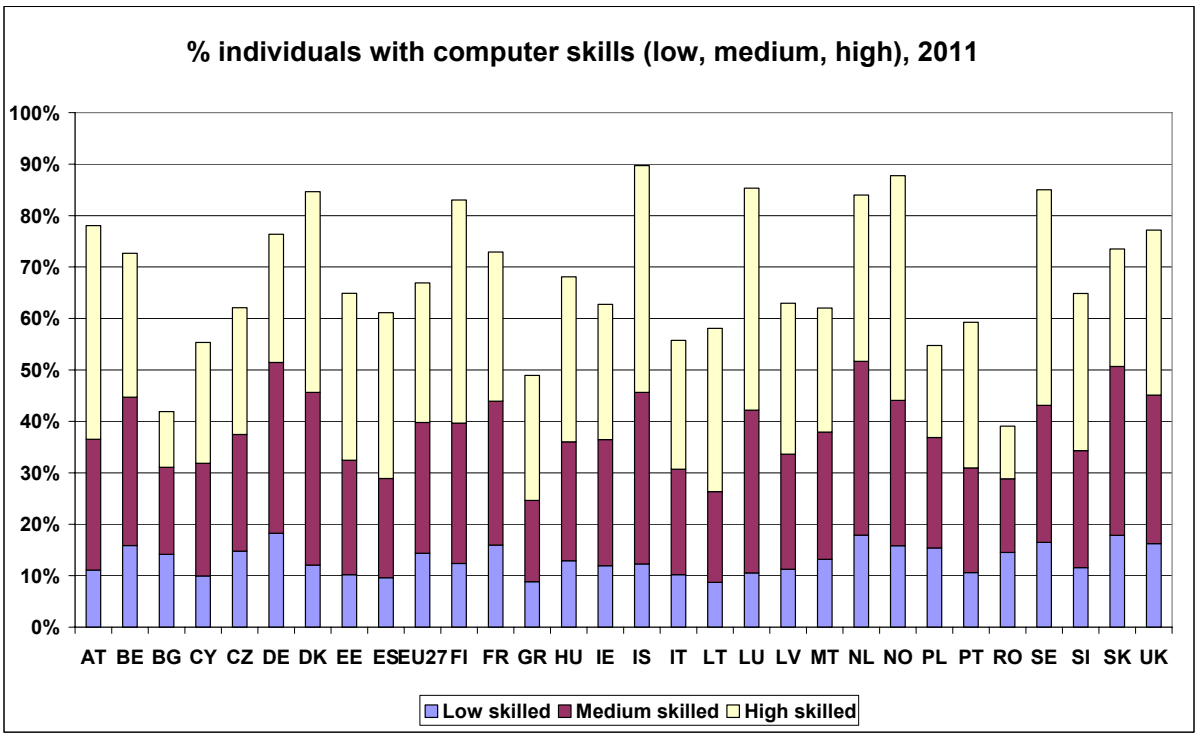
In terms of **operational computer and internet skills,** data for 2011 show that on average 75% of Europeans have performed at least one of the above six computer or internet activities, i.e. they have at least some level of digital skills. In particular, the percentage of individuals having at least some **level of computer skills** (i.e. those with high, medium, or low) has reached 68% in 2011, while the percentage of individuals having at least some level of **internet skills** has reached 73% in 2011.

⇒ **27% of Europeans have high level of computer skills…**

There has been no overall improvement in the level of skills of Europeans since 2010, except for a small shift from low to medium and high skills. On average in 2011, 14% of Europeans had low level of computer skills, 25%

medium level skills and 27% high level skills. These figures have not changed significantly since 2009 (14%, 24% and 25% respectively). However, there appear important differences among countries with Bulgaria, Greece and Romania coming in at the bottom of the ranking (Figure 125).

Figure 125

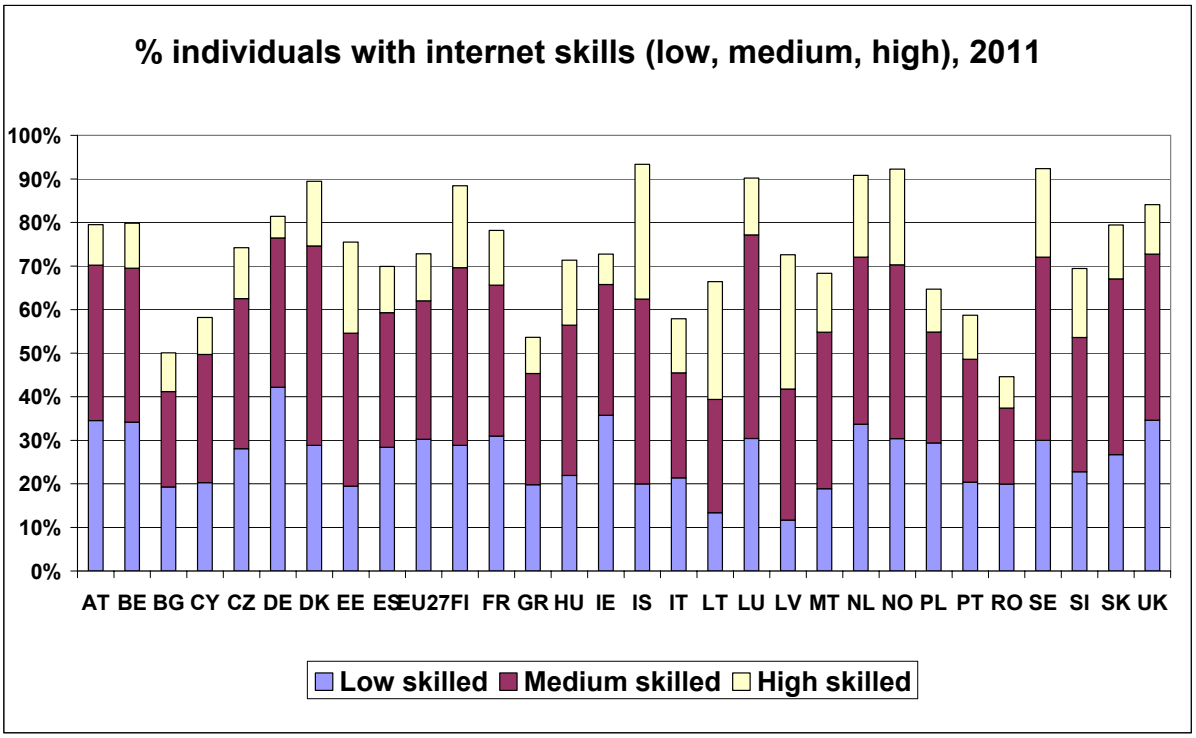


Source: Eurostat

⇒ **…But only 11% of Europeans have high level of internet skills**

Likewise, looking at **different levels of internet skills**, there is no overall improvement since last year except for a minor shift from low to medium and high skills. In 2011, on average, 30% of Europeans had low level skills, down from 32% in 2010, 32% had medium level skills, up from 29%, and 11% had high level skills, up from 10%. Again significant differences are observed among countries and the same three countries, Bulgaria, Greece and Romania, risk lagging behind in terms of their level of operational skills (Figure 126).

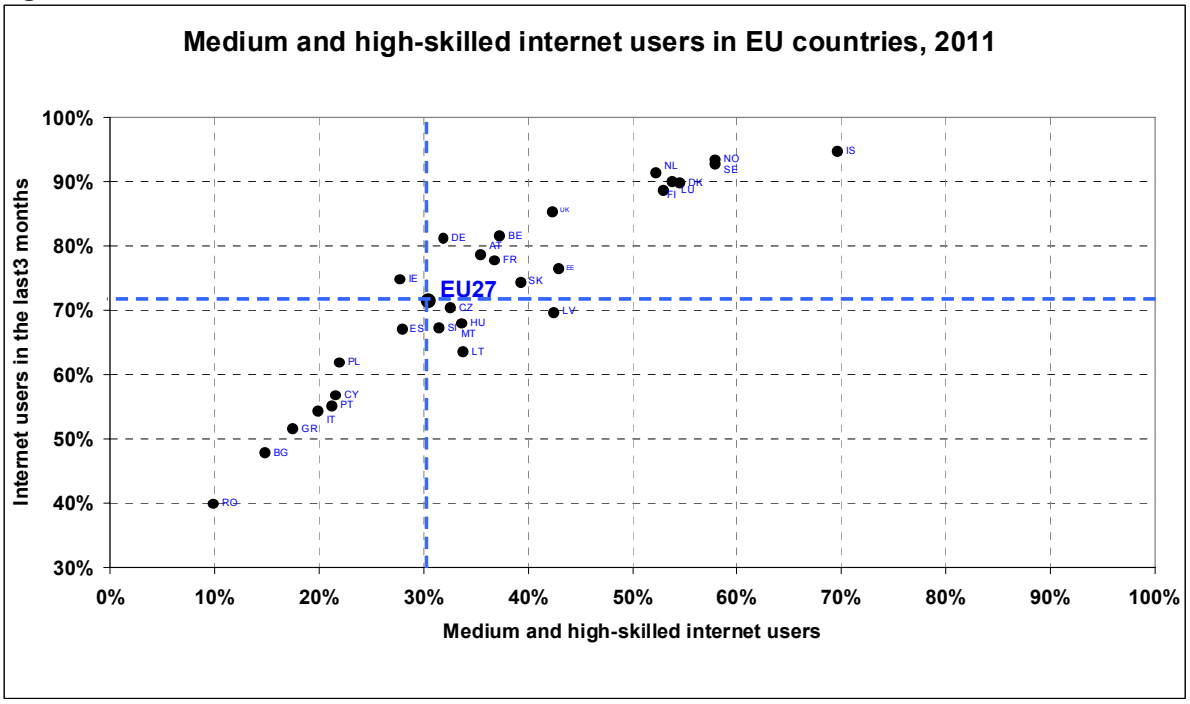
Figure 126



Source: Eurostat

Not surprisingly, there is a **positive correlation between the level of computer use and the level of skills** in the sense that countries with a higher rate of computer users tend to have a higher rate of medium and high-skilled people. In addition, on average for the EU27, the percentage of computer users in the last 3 months having **medium and high computer skills** is 38%. Similarly to computer skills there appears to be a **positive correlation between the level of internet users and the level of internet skills** in a given country. On average for the EU27, the percentage of internet users in the last 3 months having **medium and high internet skills** is 30% (Figure 127).

Figure 127



ource: Eurostat

⇒ Achieving two DAE targets by 2015:

A) 15% or less people who have never used the internet

B) 75% of regular internet users….

An increase in the rate of people who use ICT is normally accompanied by an increase in the rates of people with medium or high digital skills in a given country. One of the targets of the Digital Agenda for Europe is to *halve the proportion of the population that has never used the internet (to 15%) by 2015*. In 2011, the rate of people who have never used the internet reached 24% of the EU population, down from 26% in 2010. This implies that the DAE target is well on track to although more aggressive decreases are required during the next four years.

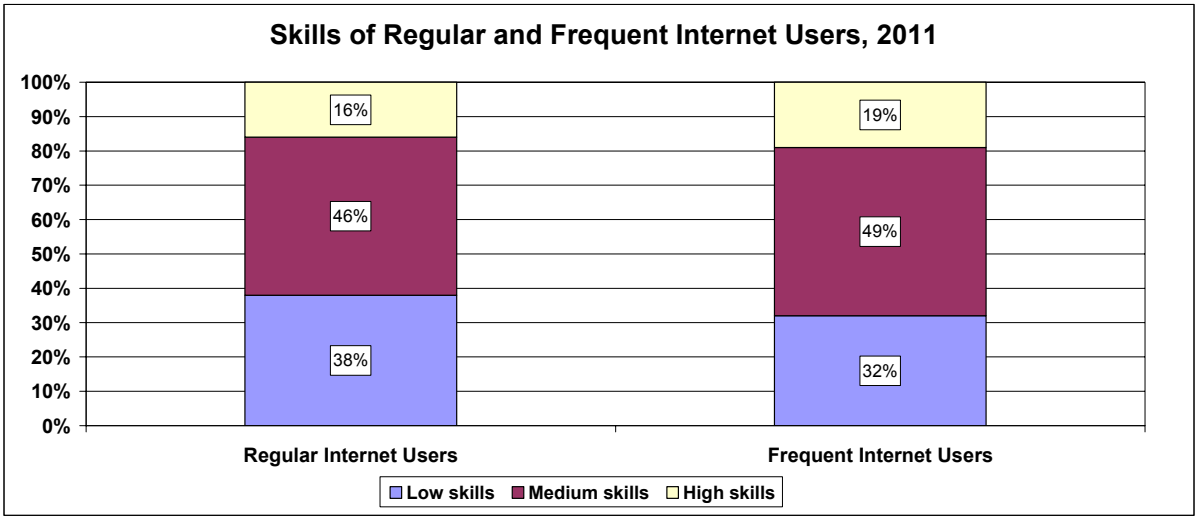
⇒ … will result in significant increase of the number of high-skilled ICT users

At the same time, the use of ICT is generally high but it has no significant impact on the level of digital skills of individuals unless this use of ICT is at least *regular* (once a week) or even *frequent* (once a day). The DAE aim is *reaching 75% of regular users in the EU by 2015*. Currently, *regular internet users* account for 68%, compared with 65% in 2010. As such, there is an increase, albeit moderate, which implies that a set of more intensive strategies should be adopted in order to increase the rates of regular internet users across EU countries[122].

[122] For a detailed overview of use of internet see Digital Agenda Scoreboard 2012, chapter "A Vibrant Digital Single Market."

Interestingly, the distribution of skills among regular and frequent internet users demonstrates that most regular and frequent internet users (1 out of 2) have medium skills and a significant percentage of them (more than 1 out of 3) have low skills (Figure 128). This result is indicative of the necessity of training in technical internet skills so that more people will move towards the "high-skilled category".

Figure 128



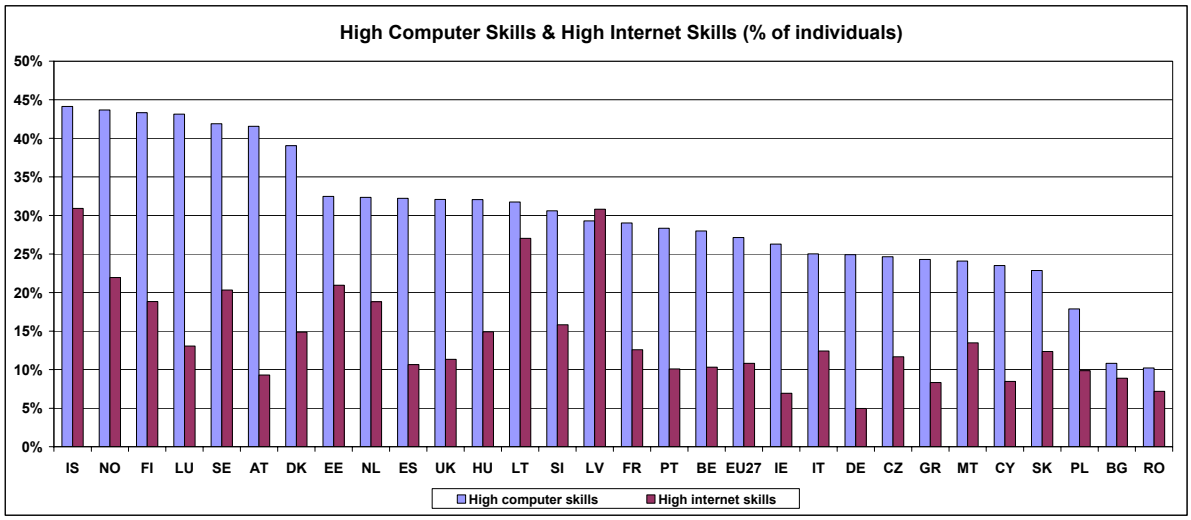
Source: Eurostat

Moreover, as mentioned above, in the EU27, 27% of individuals were **high-skilled in terms of computer skills**. The top performers in the EU were Austria, Denmark, Finland, Luxembourg, and Sweden (above 30%), whereas Bulgaria and Romania were at the bottom of the ranking with levels of 11% and 10% respectively. On the other hand, in the EU27, 11% of individuals were **high-skilled in terms of internet skills**. The top performers were Estonia, Latvia, Lithuania, and Sweden (above 20%), whereas Bulgaria, Cyprus, Greece, Ireland and Romania lay at the bottom of the ranking with less than 9% of high-skilled people in terms of internet skills[123] (Figure 129) [124].

[123] Germany also appeared at the bottom of the ranking in high internet skills. The reason is because the rate of individuals in Germany who ticked the item "using peer-to-peer file sharing for exchanging movies, music, etc" is extremely low, so the skills index "collapsed". This is probably related to the legal implications of this particular task, i.e., as in many other countries, the law imposes significant limitations to such activities.

[124] The countries are ranked in terms of the rate of people with high computer skills as a % of individuals aged 16-74 years.

Figure 129



Source: Eurostat

While this index calculates high, medium and low levels of internet skills depending on the number of listed activities carried out, it is also possible to determine levels of skill by looking at the **percentages of individuals that carried out each of the various activities**, which themselves can be considered as varying in complexity and therefore requiring a varying level of skill. In particular, in terms of internet skills, for example, while using a search engine and sending an email with attached files can be considered as requiring relatively low levels of skill, posting a message to a chat site etc. and uploading text etc. to websites might be considered slightly more complex and the remaining tasks even more so. This varying complexity is also reflected in the rates of use of this range of activities. By the same token, computer skills can be measured by looking at the percentages of individuals that carried out each of the various computer-related activities. Specifically, copying or moving a file or folder as well as using copy and paste tools to duplicate or move information within a document can be considered as requiring low level skills. On the other hand, compressing files and connecting and installing new devices require a higher level of skills, while writing a computer program using a specialised programming language involves an even more complex set of skills.

Assuming that the level of difficulty of a given activity is linked to the level of skills, high-skilled people (i.e. those performing more complex activities) represent a lower percentage of Europeans than the other categories (tables 8 and 9). An exemption is P2P file sharing which is probably underestimated and in terms of task complexity is considered similar to uploading files. The types of activities requiring high skills are also indicative of the types of training that Europeans need in order to use computers and the internet more effectively.

Table 8

Internet skills	Average % of individuals in EU27	Level of difficulty
Use a search engine to find information	71%	Low
Send emails with attached files	63%	Low

Post messages to chatrooms, newsgroups or an online discussion forum	33%	Medium
Use the internet to make telephone calls	26%	Medium
Upload text, games, images, films or music to websites	27%	Medium
Use peer-to-peer file sharing for exchanging movies, music, etc	15%	Medium
Create a web page	11%	High
Modify the security settings of internet browsers	23%	High

Source: Eurostat

Table 9

Computer skills	Average % of individuals in EU27	Level of difficulty
Copy or move a file or folder	63%	Low
Use copy and paste tools to duplicate or move information within a document	61%	Low
Transfer files between computer and other devices	51%	Low
Use basic arithmetic formulas in a spreadsheet	43%	Medium
Compress (or zip) files	37%	Medium
Connect and install new devices, e.g. a modem	43%	Medium
Create electronic presentations with presentation software (e.g. slides)	31%	Medium
Modify or verify the configuration parameters of software applications	26%	Medium/High[125]
Write a computer program using a specialised programming language	10%	High
Install a new or replace an old operating system	21%	High

Source: Eurostat

⇨ **Individuals use the internet to carry out various activities depending on their level of digital skills as well as their socio-economic**

This indicator has its limitations. The percentage of individuals that undertake certain activities depends largely on the *age* group to which they belong as well as on their educational level. Moreover, it is obvious that senior people use ICT to perform types of activities that are substantially different from the ones performed by younger individuals. That said, while 35% of persons above 55 years old have copied or moved a file or folder,

[125] The classification depends on the type of parameters

background. only 11 % of them have created electronic presentations with presentation software and only 8% have installed a new or replaced an old operating system. Likewise, while 35% of senior individuals (above 55 years old) have sent emails with attached files, only 8% of them have uploaded text, games, images, films or music to websites and an even lower rate 3% have created a web page. This observation could simply be attributed to the fact that older people do not need or do not want to undertake certain activities rather than that they are not skilled enough. Consequently, the rates associated with the above activities are notably influenced by the fact that different people of different socio-economic backgrounds like or need to carry out different activities irrespective of their level of digital skills.

4.1.3. Active application to aspects of life

People are increasingly using the internet as the chief tool to perform various everyday activities. Without a doubt, the range of **activities which individuals are performing using the internet** is broad, such as communicating, looking for information, participating in blogs and social networks, taking courses, looking for a job, making travelling and leisure arrangements, etc. A number of common activities are listed in the Eurostat survey, most of which require some level of internet skills. These can be categorised as follows:

- Communication
- Access to information
- Civic and political participation
- Learning
- Professional life
- Leisure or business travelling
- Use of online services
- Use of e-Government
- Use of e-Commerce

Popular activities among people who have used the internet in the last three months are those related to access to information, as well as using travelling or accommodation online services, consulting wikis and participating to social networks[126]. In fact, to a large extent Europeans go online in order to discover different types of information, such as information about goods and services, news, health or any other subject. On average 79% of individuals who have used

[126] The analysis is based on indicators on the use of the internet in the last three months for various purposes collected via the Eurostat survey of ICT use in Households and Individuals. While the questions on skills analysed above usually do not stipulate a time period, but simply ask about accumulated experience and whether the individual has done any of the activities at any time of the past, skills, especially ICT skills, become quickly obsolete, therefore if one does not stipulate a time period it can not be determined whether the skill is actually still present. While three months is perhaps a shorter period than desirable, it nevertheless ensures the skill is actually present, being used and is strengthened by the evidence that most internet users go online every day, or at least every week.

the internet in the last 3 months have searched for information about goods and services, 56% have read or downloaded online newspapers and 54% have consulted wikis or looked for health information. In addition, 54% of internet users are keen on making travel and accommodation arrangements online, such as buying airplane tickets, renting cars and booking hotels. Participating to social networks is equally popular since about 1 out of 2 (54%) individuals who have used the internet in the last 3 months reported that they have created user profile, posted messages or made other contributions to Facebook, Twitter, or other social network.

On the other hand, professional networks are not as popular as social networks, since only 10% of individuals used the internet in the last 3 months to create user profile, post messages or make other contributions to LinkedIn, Xing, or other similar network. Likewise, although 20% of internet users are keen on reading and posting opinions on civic or political issues via websites, only 10% are taking part in online consultations or voting to define civic or political issues (e.g. urban planning, signing a petition). This is probably attributed to the fact that most people prefer to undertake such activities through traditional (offline) ways instead. Finally, subscribing to news services or products to receive them regularly and doing an online course are also less popular activities, with rates of 8% and 7% respectively.

The table below lists a number of activities which individuals are performing online. These activities have been ranked, starting from those performed by the higher average rate of individuals who have used the internet in the last three months (table 10). As such, finding information about goods and services is the most popular activity among internet users whereas doing an online course is the least popular one. Activities related to eGovernment and eCommerce are presented separately.

Table 10

Activities	% internet users (last 3 months)	Type of activity
Finding information about goods and services	79%	Access to information
Reading/downloading online newspapers/news	56%	Access to information
Travel and accommodation services	54%	Leisure or business travelling
Consulting wikis (to obtain knowledge on any subject)	54%	Learning
Seeking health information	54%	Access to information
Participating in social networks (creating user profile, posting messages or other contributions to Facebook, Twitter, etc.)	53%	Communication

Internet banking	53%	Use of online services
Looking for information about education, training or course offers	40%	Access to information
Telephoning or video calls	29%	Communication
Selling goods or services	24%	e-Commerce
Job search or sending an application	23%	Professional life
Reading and posting opinions on civic or political issues via websites	20%	Civic and political participation
Participating in professional networks (creating user profile, posting messages or other contributions to LinkedIn, Xing, etc.)	10%	Professional life
Taking part in on-line consultations or voting to define civic or political issues (e.g. urban planning, signing a petition)	10%	Civic and political participation
Subscribing to news services or products to receive them regularly	8%	Access to information
Doing an online course (of any subject)	7%	Learning

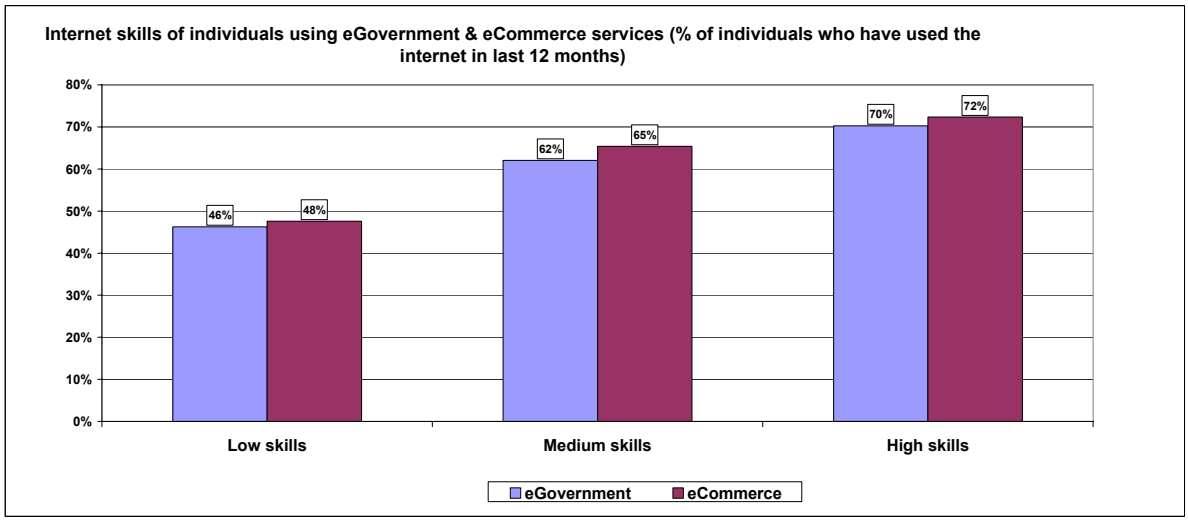
Source: Eurostat. * Calculated as an average EU 27 percentage of individuals who have used the internet in the last 3 months (2011)

4.1.4. Skills and use of eGovernment and eCommerce services[127]

The use of online government services appears to be strongly related to individuals level of skills. As such, among individuals who have used the internet in the last 12 months, those with higher skills are more likely to have used it for interaction with the public authorities (Figure 130). Interaction with the public authorities involves a variety of activities such as obtaining information from public authorities's web sites, downloading official forms and sending filled in forms, including for the purpose of tax declaration. Similarly, regarding the use of e-Government services, people with higher skills are more likely to engage in e-commerce activities (Figure 130).

[127] For a detailed analysis of the use of eGovernment and eCommerce see Chapters 1 and 7 respectively of the Digital Agenda Scoreboard 2012

Figure 130[128]



Source: Eurostat

4.1.5. Personal attitudes

Personal attitudes refer to the manner in which individuals use ICT. Digital competence encompasses the ability to select information and to analyse it creatively, critically, constructively, confidently and responsibly. While direct measures of the personal attitudes required to be digitally competent are not available, some can be proxied.

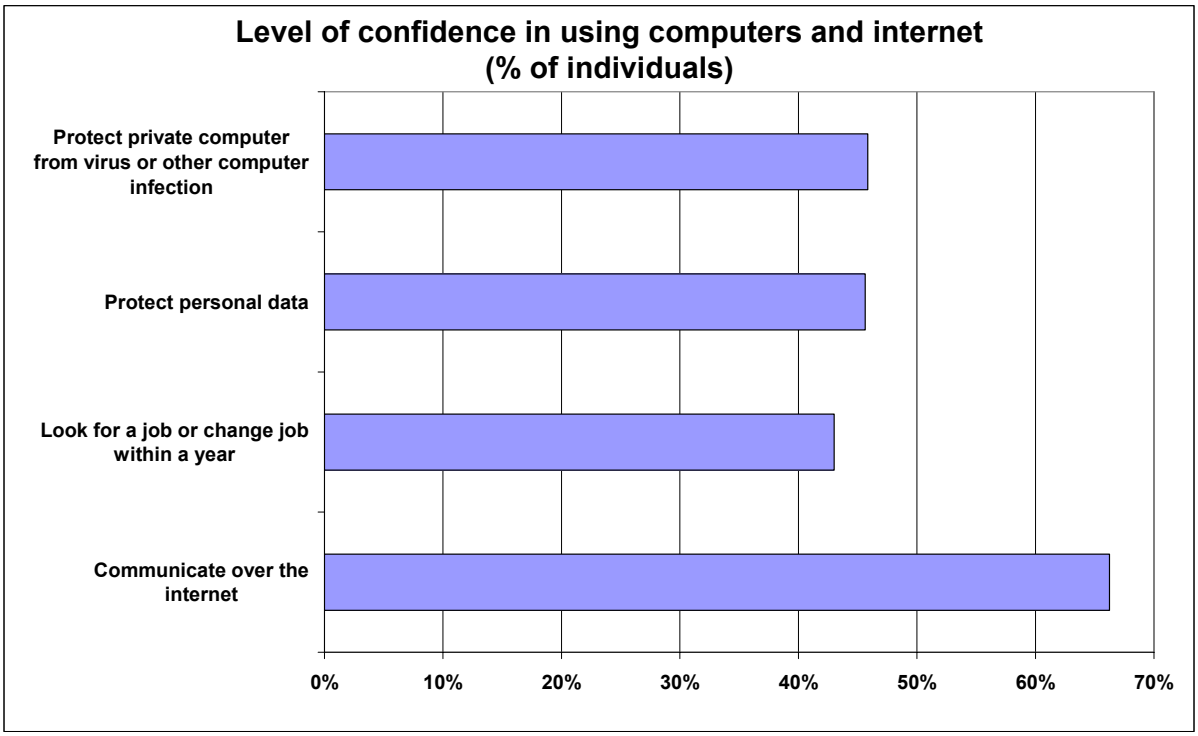
In particular, responsible use is proxied by the following user statement: "I have modified the security settings of internet browsers". On average, only 23% of individuals in the EU were able to modify the security settings of internet browsers, to protect their privacy and security. While, a number of countries -- Austria, Denmark, Estonia, Finland, Luxembourg, and Sweden exhibited rates near to or above 40%, in Bulgaria, Cyprus, and Romania, rates were below 10%.

Confident use can be proxied by the **level of confidence** individuals say they have to perform various activities using a computer or the internet. The Eurostat special module on ICT skills includes this question for the first time this year. Only 43% of Europeans said they were confident that their level of skills is sufficient if they were to look for a job or change job within a year (Figure 131). The Nordic countries, Luxemburg, the Netherlands and the UK have the highest levels; close to 60% or above but no more than 80%. Cyprus, Romania, Greece and Italy exhibit rates of below 30%. At the same time, 66% of individuals believe that they have sufficient skills to communicate with friends, colleagues and relatives over the internet. Again the Nordic countries, the Netherlands, Luxembourg and the UK are the leaders in this indicator with rates above 80%, whereas Romania, Greece, Bulgaria, Italy and Cyprus are at the bottom end with rates equal to or below 50%. Concerning privacy and security, 46% said they trusted that they were adequately skilful to protect their personal data and to protect their personal computer from viruses and other computer infections. The Nordic countries

[128] The percentage of individuals who have used the internet in the last 12 months for interaction with public authorities and for ordering goods or services over the internet for private use as a percentage of individuals who have used the internet in the last 12 months

along with Austria, the Netherlands, Luxembourg and the UK are the top nine countries in both indicators (close to 55% or above but no more than 70%), while Lithuania, Italy, Greece, Romania and Bulgaria are the bottom four countries (equal to or below 30%).

Figure 131



Source: Eurostat

Furthermore, looking more specifically at only those individuals in the active labour market (i.e. individuals either in employment, self-employment or actively looking for a job) shows that on average in EU27 53% are confident their IT skills are sufficient if they were to look for a job or change job within a year. The Netherlands, Sweden, and the UK exhibit the highest levels of confidence with rates of 85%, 86% and 80% respectively. Denmark and Finland are also high at the ranking with rates above 65%. Conversely, five countries, Cyprus, Greece, Italy, Lithuania, and Romania, lay at the bottom of the ranking since the levels of confidence do not exceed 40%.

Finally, **creative use** procxied by data on the uploading of text, games, images, films or music to websites and to the creation of web pages. s such, Only 11% of individuals have created a web page while 27% have uploaded text, games, images, films or music to websites (Iceland has exceptionally high rates of 32% and 57% respectively).

4.1.6. Skills and socio-economic factors[129]

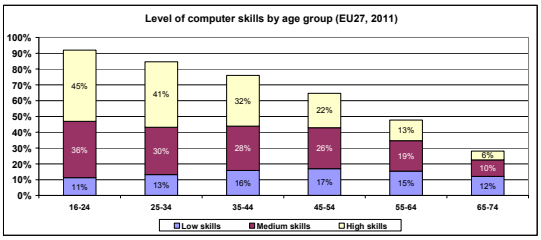
A number of **socio-economic variables** are associated with the computer and internet skill levels of individuals: age, gender, educational level, employment status, household income, citizenship and type of locality. The following section examines the computer skill level of Europeans in terms of each of the above socio-economic factors.

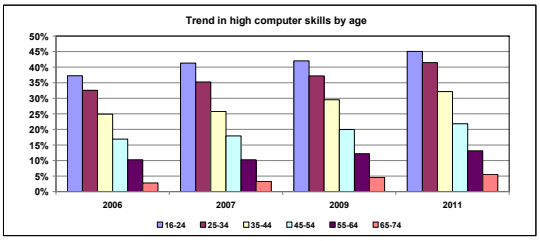
[129] The data in this section do not include the UK and NL. These will be added in due time.

AGE

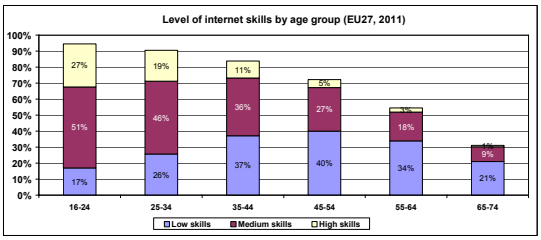
Senior individuals are more likely to have a lower level of computer and internet skills but the percentage of individuals with high computer and internet skills tends to increase over time and in all age groups (Figure 132).

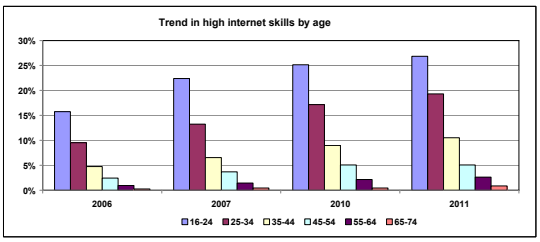
Figure 132





Source: Eurostat

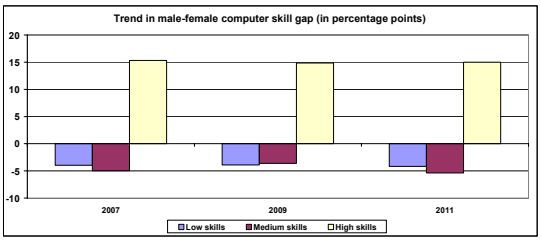


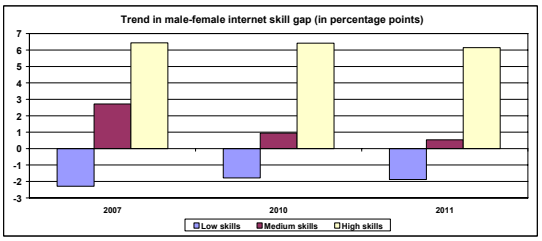


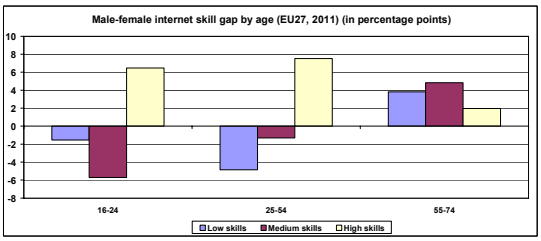
GENDER

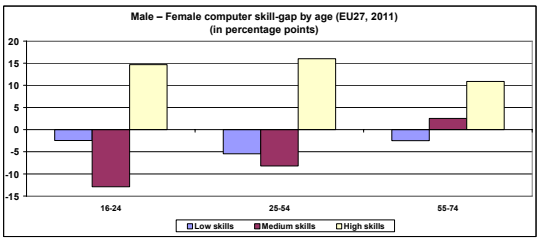
The male-female skills gap has been decreasing over time at all skill levels with more and more women acquiring higher levels of computer skills. The percentage of men that appear to have high skills is much higher than the respective percentage of women (by 14 percentage points) although the difference has been decreasing steadily between 2007 and 2011. At the same time, women tend to outnumber men in the low and medium skill levels, albeit by a few percentage points, but again the difference is gradually bridged over time. For high level of skills the male-female gap is bigger in younger age groups (Figure 133). This is partly related to the fact that the rate of internet users in older age groups is small.

Figure 133







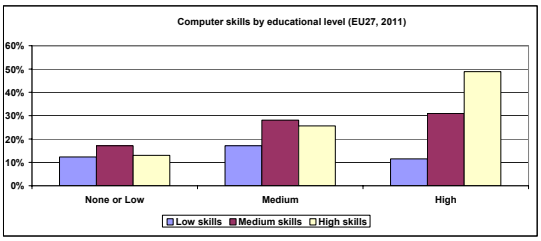


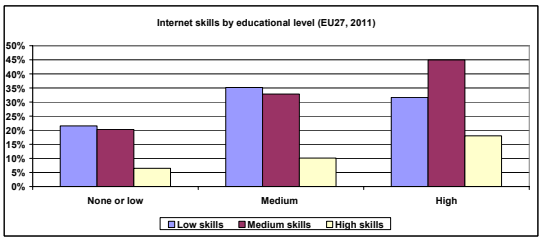
Source: Eurostat

EDUCATION

The majority of Europeans (48%) that have high skills have also acquired high formal education indicating a positive relationship between the educational level and the computer and internet-skill level (Figure 134).

Figure 134





Source: Eurostat

Overall, the rates of individuals with low, medium and high skills over time with any given level of education and at any age signify that eventually people seem to acquire higher digital skills, although the increase is moderate and differs among different age groups and levels of formal education. For example, the rate of older individuals (age 55-74) who have a high level of education and a high level of internet skills has not changed significantly over time but the rate of those with medium skills increased by 17 percentage points, meaning that over time, highly educated senior persons move from low to medium level skills. The same is not true though for senior individuals with low and medium levels of formal education. In particular, the increase of the rate of low-educated seniors with high skills is trivial. Furthermore, middle-age individuals (age 25-54), irrespective of their educational level, seem to move from a low to medium level of internet skills, whereas the increase of the rate of high-skilled middle-age persons is moderate, although higher for highly-educated ones (by 9 percentage points). Finally, the so-called "digital natives" (age 16-24) exhibit the highest increase among those with a high level of internet skills, irrespective of their level of formal education. Still, among the highly educated ones, the increase is the highest; 18 percentage points (Table 11).

⇨ Seniors and low-educated Europeans are at higher risk of being left behind

In brief, Europeans tend to become more digitally competent over time, probably because they acquire training to boost their digital skills. However, considerable efforts are required to reach elevated rates of high-skilled among persons above 25 years old, especially those with lower levels of formal education. On the contrary, 16-24 year-olds (natives of the digital era) are well on track to attain enhanced digital competence.

Table 11 Skills of different age groups and educational levels

		Low internet skills					Medium internet skills					High Internet skills				
		2006	2007	2010	2011	Δ (2006 - 2011) in p.p.	2006	2007	2010	2011	Δ (2006 - 2011) in p.p.	2006	2007	2010	2011	Δ (2006 - 2011) in p.p.
Individuals aged 16-24	Low formal education	27%	22%	21%	18%	**-10**	40%	43%	49%	51%	**11**	14%	18%	22%	22%	**8**
	Medium formal education	27%	24%	19%	17%	**-10**	40%	42%	50%	51%	**11**	16%	24%	26%	28%	**12**
	High formal education	32%	17%	16%	13%	**-18**	42%	46%	50%	47%	**4**	21%	35%	33%	39%	**18**
Individuals aged 25-54	Low formal education	21%	22%	29%	30%	**9**	9%	12%	18%	21%	**12**	2%	3%	5%	5%	**3**
	Medium formal education	39%	39%	42%	40%	**1**	19%	23%	33%	35%	**16**	5%	7%	8%	9%	**4**

Individuals aged 55-74	High formal education	45%	39%	33%	29%	**-16**	35%	39%	46%	48%	**14**	11%	14%	18%	20%	**9**
	Low formal education	8%	9%	15%	15%	**7**	1%	3%	4%	5%	**4**	0%	0%	0%	0%	**0**
	Medium formal education	24%	26%	36%	36%	**12**	6%	8%	13%	16%	**10**	1%	1%	1%	2%	**1**
	High formal education	43%	43%	48%	45%	**2**	16%	21%	29%	33%	**17**	2%	3%	4%	6%	**3**

Source: Eurostat

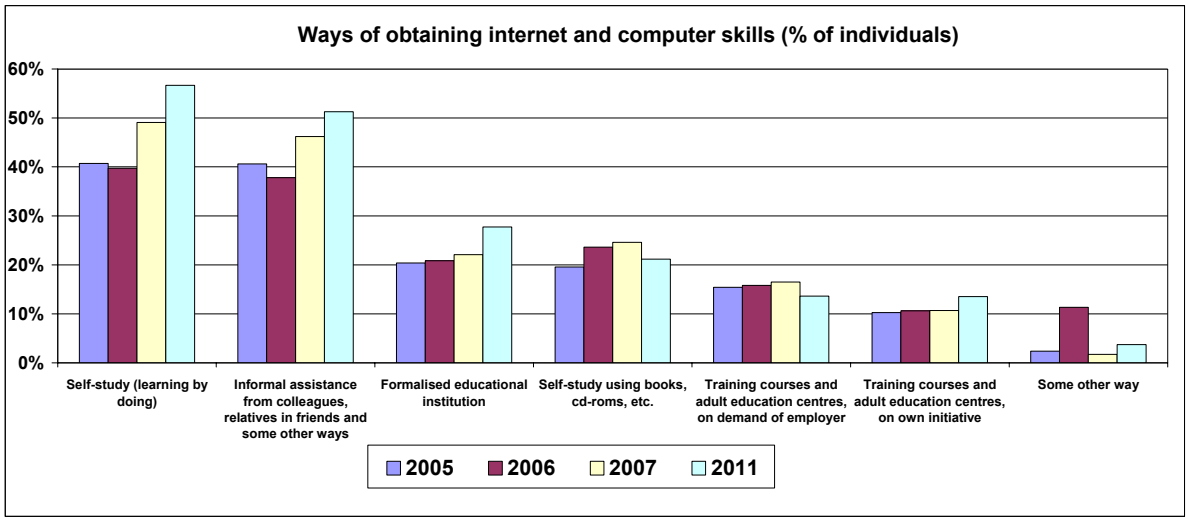
Moreover, the picture of employed and unemployed people with regards to their computer and internet skill level, demonstrates that employed people generally appear more skilled than unemployed ones. This indicates that there is a positive relationship between the level of skills and the **employment status**. Specifically, the rate of employed individuals of age 25-64 years old that have at least some level of operational skills is higher than the rate of unemployed individuals of the same age that also have at least some level of operational skills, by 17 percentage points. Similarly, considering the same two groups, but without taking into account age, the difference is 13 percentage points, with the rate of employed individuals being higher. The picture is very similar when considering individuals with at least medium skills (16 and 12 percentage points respectively) as well as when considering individuals with high skills (11 and 9 percentage points respectively).

Furthermore, looking at other socio-economic factors, there is a positive correlation between the level of digital skills and **household income**. It is also evident that in urban (densely populated) areas individuals have higher levels of computer and internet skills, i.e. the **type of locality** is related to the level of skills. Finally, there appears to be no strong relation between **nationality** and level of skills.

4.1.7. Ways of obtaining digital skills

There are a number of ways in which **internet and computer skills are obtained.** Among them, self-study (learning–by-doing) and informal assistance from colleagues, relatives and friends are the most popular with 57% and 51% of EU citizens obtaining their skills in these ways respectively. These are followed by learning through a formalised educational institution (28%) and self-study using books, cd-roms, etc (21%). Training courses and adult education centres, either by employer demand or by an own initiative, are less popular with rates of 14% for both of them in 2011 (Figure 135).

Figure 135

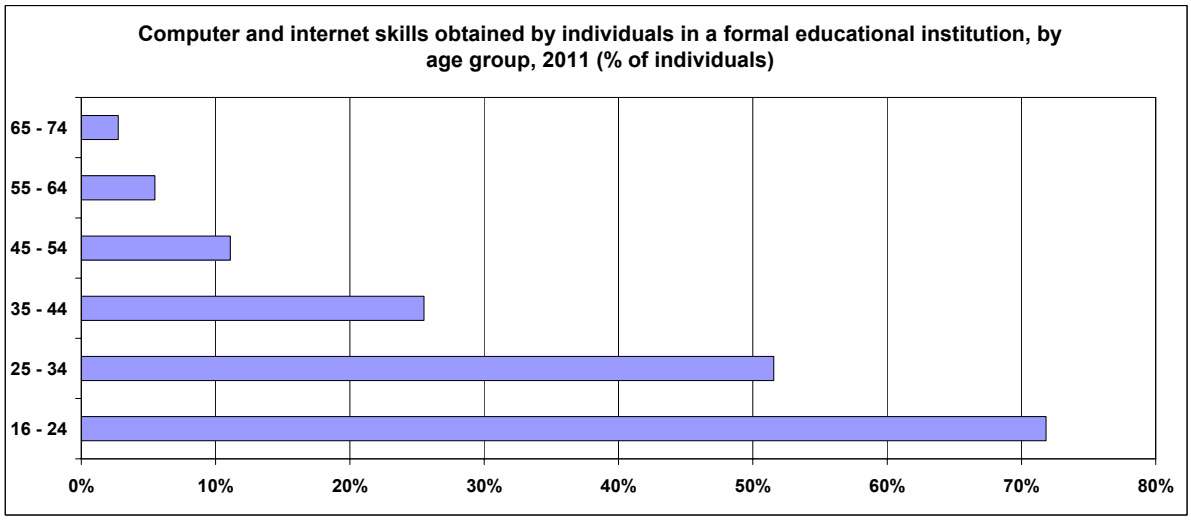


Source: Eurostat

The most popular ways of obtaining digital skills among senior people, above 55 years of age, are informal assistance from colleagues, relatives or friends (34%) and self-study (learning-by-doing) (32%). Training courses and adult education centres, either on demand of the employer or by own initiative, and self-study using books, cd-roms, etc. come second, while obtaining digital skills by a formal educational institution is trivial in this age group.

A formal educational institution, e.g. school, university etc. is a popular way to obtain internet and computer skills among individuals aged between 16-24 years old (72%) and among 25-34 year olds (52%). The older the individuals, the less likely they are to have obtained their skills at school, which is unsurprising given that the development and increased use of digital tools is a rather recent phenomenon (Figure 136).

Figure 136



Source: Eurostat

4.2. ICT skills in education[130]

ICT and Education is included in the action area of the Digital Agenda, enhancing digital literacy, skills and inclusion. It proposes a number of actions, at both EU and Member States level, to increase digital literacy and mainstream eLearning in national policies (for the modernisation of education and training, including in curricula, assessment of learning outcomes and the professional development of teachers and trainers.)

Indeed, the European Commission recognizes that it is essential to educate the young in the use of ICT and digital media and to attract them to ICT in education as well as to make the best use of ICT within education for improving educational outcomes. An important element of the Commission's contribution to the improvement of public services – amongst which is education – is benchmarking of progress. This is not a purely statistical exercise but aims to provide information to enable Member States to monitor their performance in relation to the use of ICT in schools. Benchmarking is also intended to orientate policy development in the field of ICT in education.

It has been observed that there is a lack of information on the availability, use and impact of ICT for learning in schools across Europe. For this purpose, in 2011, the European Commission Directorate General Information Society and Media launched the *Survey of Schools: ICT in Education*, the primary goal of which is to benchmark countries' performance in terms of ICT in Education. The aim of this study, therefore, is to benchmark recent progress made in ICT in education by surveying students and teachers on the availability and use, including competences and attitudes, of ICT in schools. The study shall as such contribute substantially to the development of updated, relevant and efficient indicators as well as to the establishment of a long-term and continuous monitoring system on the ICT use ranging from issues such as frequency, purpose and impact/effect. The survey comprises three questionnaires derived from an analytical framework and based on the results of a literature review. Compared to previous studies, this is the first time that students directly participated in the survey, answering a questionnaire that is specifically designed for them.

[130] The results from the *Survey of Schools: ICT in Education*, SMART 2010/0039 that are presented here are provisional and based on the draft final report. The section "ICT in Education" will be finalised as soon as the final report is completed.

Box 3: Methodology of Survey of Schools: ICT in Education

Questionnaires

Three questionnaires:

1) Head teachers
2) Class teachers

At three levels:

- Primary (ISCED1 - grade 4 – 9.5 years old on average),
- Lower secondary (ISCED2 - grade 8 – 13.5 years old on average),
- Upper secondary academic (ISCED3A) and upper secondary vocational (ISCED3B) education (ISCED3 - grade 11 – 16.5 years old on average).

3) Students:

At two groups:

- ISCED2 (grade 8 – 13.5 years old on average)
- ISCED 3 (grade 11 – 16.5 years old on average).

The same questionnaire was administered to both groups of students and addresses ICT use both in and out of school with some differences between academic and vocational tracks at ISCED 3 level.

	ISCED1 grade 4	ISCED2 grade 8	ISCED3 academic grade 11	ISCED3 vocational grade 11	Questionnaire
SCHOOL	N=300	N=300	N=300	N=300	Principal
TEACHER	N=1	N=3	N=3	N=3	Teacher
STUDENT	/	N=all students in the selected class	N=all students in the selected class	N=all students in the selected class	Student

Academic and vocational tracks at ISCED 3 level

ISCED3 level is segmented into two tracks: the academic and the vocational one. Vocational education training (VET) differs to a large extent to general (academic) education in its educational goals and structure as it prepares students for specific workforce skills. Usually, vocational training relates to workplace training (to a lesser or bigger extent depending on the systems) and therefore involves job specific ICT tools (e.g. software programs, tools). Depending on the job to be trained for, these tools can vary a lot between the different professional strands. VET is also characterised much more than general education by cooperation of VET institutions with private sector partners.

Analysis

- Data collection ran from September to December 2011
- Data analysis began in January 2012 after the online survey system was closed down and the data exported.
- Unreliable data was identified, where numbers of responses to the survey were insufficiently high (i.e. below 40 per level). This had the effect of eliminating four countries because these countries exhibited low participation rates in the survey: Germany, Iceland, Netherlands and United Kingdom.

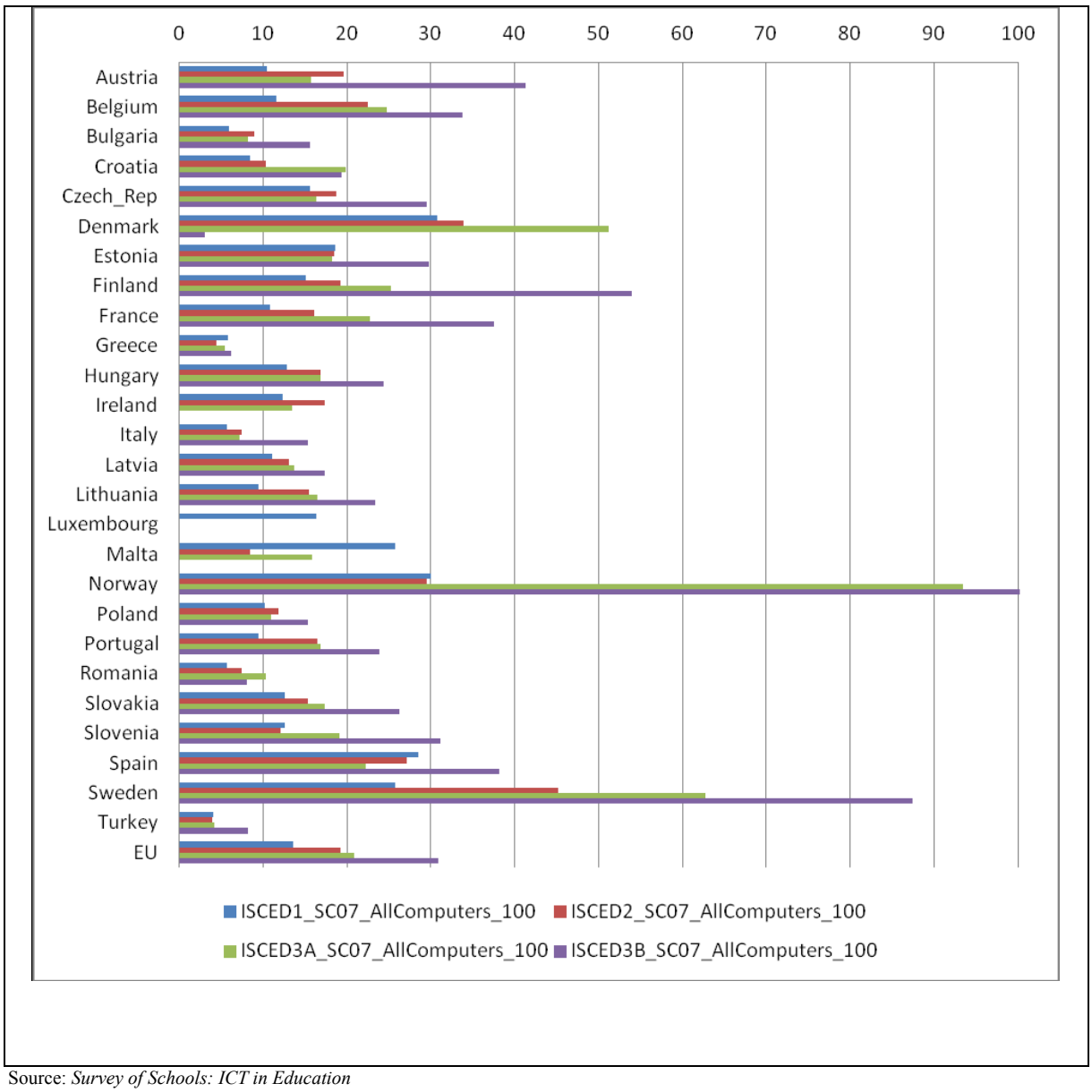
The final report is expected in the summer of 2012

4.2.1. Schools' equipment and strategies

⇨ **In Europe at all class levels there are between 14 and 31 computers per 100 students**

On average in Europe if both **desktop and laptop/tablet, connected or not to the internet**, are aggregated, there are 14 per 100 students at grade 4, 19 at grade 8, 21 at grade 11 general and 31 at grade 11 vocational. In Norway, at grade 11 vocational there are 101 such computers per 100 students (Figure 137).

Figure 137: Computers (desktop/laptop, online/offline per 100 students: all grades



Source: *Survey of Schools: ICT in Education*

Of these computers, almost all are internet-connected (less than one non-internet connected PC per 100 students at all levels). In the EU, there are from five to 12 students per online desktop computer: eight per 100 students at grade 4, 13 at grade 8, 14 at grade 11 general and 21 for every 100 grade 11 vocational students. The older the student, the more online computers are available.

Laptops (including tablets, netbooks and mini-notebooks) are becoming pervasive in Europe's schools, almost all internet-connected at every level.

Trends in schools equipment 2006 - 2011

- At **grade 4**, benchmark changes since 2006 as regards computers per 100 pupils show an increase in the numbers of such computers per 100 students from 9.5 (EU25+2 average) to 14.7.
- Benchmark changes since 2006 as regards computers per 100 pupils at **grade 8** show an increase in the numbers of such computers per 100 students from 10.9 (EU25+2 average) to 17.8.
- At **grade 11 general**, benchmark changes since 2006 as regards computers per 100 pupils show an increase in the numbers of such computers per 100 students from 12.7 (EU25+2 average) to 20.6.
- Benchmark changes since 2006 as regards computers per 100 **grade 11 vocational** pupils show an increase in the numbers of such computers per 100 students from 15.8 (EU25+2 average) to 29.5.

A number of **correlations** are observed at country level, but none at EU level. Interestingly, at grade 4 in Hungary, Norway and Portugal, the higher the percentage of students from low-income families in a school, the more online computers tend to be available.

⇨ **Over 9 out of 10 students in Europe are in schools with broadband**

Finally, a European student is highly likely to be in a school with **broadband connectivity**, typically between 5 and 10 MBps at all four levels. In 2006, 65 to 75% of schools had broadband connectivity. However, between 4 and 8% of students in Europe were in schools with no broadband. At grade 4, 10% of students were in schools with no broadband at all, dropping to 5% at grade 8, 4% at grade 11 general and rising again to 7% in vocational schools. Therefore, the data suggests that in every country there are students at all four levels in schools with no broadband.

In terms of **school strategies to use ICT in teaching and learning** at EU level and depending on the grade concerned:

- around 60% of students go to a school where school leaders and teaching staff regularly discuss the use of ICT for teaching and learning
- between 34% and 38% of students go to a school where a written statement about the use of ICT specifically for teaching and learning exists
- between 45% and 56% of students go to a school with a policy which it enacts to use ICT for teaching and learning in specific subjects

- between 61% and 69% of students go to a school which has a policy for responsible internet behaviour
- between 32% and 43% of students go to a school with a policy about the use of social networks in teaching and learning
- between 47% and 57% of students go to a school where there is a policy to encourage teachers to cooperate and/or have time scheduled for such cooperation

4.2.2. Use of ICT by teachers for teaching purposes (last 12 months)

Turning now to the actual **use by teachers of the school infrastructure**, between 95 and 97% of students were in schools at the four levels where teachers have used computers and/or the internet for preparing lessons in the last 12 months. The percentage of students in schools where teachers have used computers and/or the internet for class teaching in the last 12 months was 86 (grade 4), 81 (grade 8), 84 at grade 11 general and 87 at grade 11 vocational.

On average in the EU, at all four levels, 90 to 95 percent of students were in schools where teachers reported **using material found on the internet**, the most frequently used type of learning content. The use of online material from established educational sources was also frequently reported (75-89%). Interestingly, 52% of grade 4 students were in schools where teachers reported that they used content stored on the school network or database; higher than at other educational levels.

In the EU, 13% of grade 4 students are in schools where **teachers reported using computers and/or the internet** in more than half of their lessons; 30% were in schools where teachers used ICT in 5% or fewer lessons; that compares with 15% and 20% in 2006. At grade 11 general, these percentages were similar (15% and 24%). In 2006, the percentages for this grade were almost identical: 15% and 23%. At grade 11 vocational, the percentage doubles to 31% for use in over 50% of lessons, while 16% of students were in schools where ICT was used in 5% or fewer lessons. In 2006 the percentages were 13 and 25.

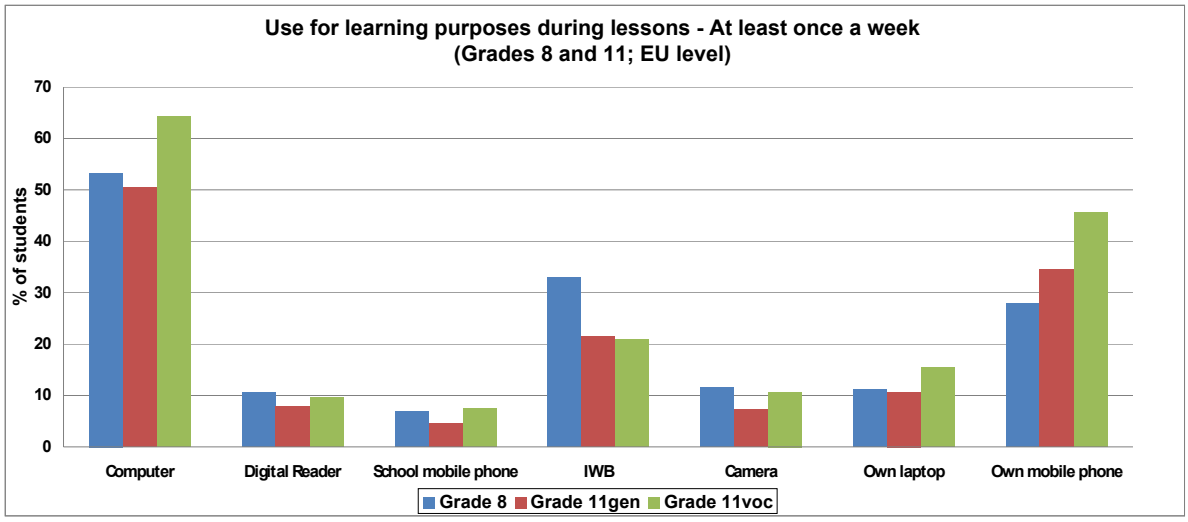
A virtual learning environment (VLE) or learning platform is arguably the strongest indicator of connectedness. Across the EU, one grade 4 student in three is in a school with a VLE. This figure is considerably higher in secondary schools, where more than one in two students are in schools with VLEs (56% of grade 8, 61% of grade 11 general and 63% of grade 11 vocational students).

4.2.3. Use of ICT by students for learning purposes

Across the EU, grade 8 students reported the highest use (at least once a week) of desktop computers connected to the internet, followed by the interactive whiteboard (IWB), their own mobile phone and online laptops/tablets. In addition, 21% of students reported using their mobile on a daily basis during lessons for learning, more than any other technology.

At grade 11 general, the online computer is mostly used, followed by the IWB. The same pattern appears at grade 11 vocational. On average, 27% of students at grade 11 general and 36% of students at grade 11 vocational reported that they used their own mobile phone in lessons on a daily basis (Figure 138).

Figure 138

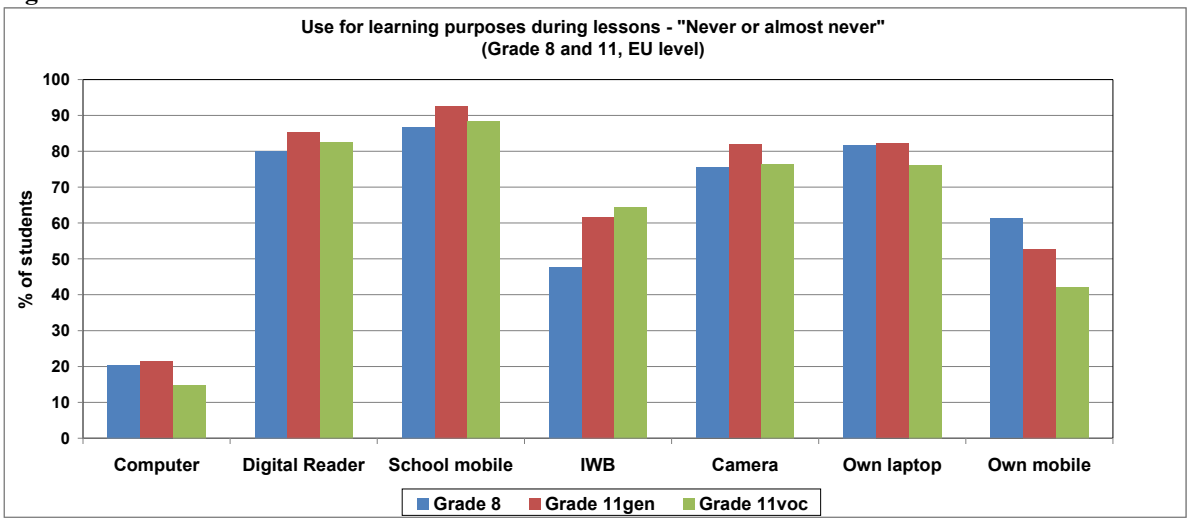


Source: *Survey of Schools: ICT in Education*

⇨ **About 1 out of 5 students in grade 8 never or almost never use an online computer**

Against this backdrop of relatively intense ICT use by students, there is a group which never, or almost never, uses these devices. Approximately one in five grade 8 students in the EU never, or almost never, uses a computer and one in two grade 8 and 11 students never uses an interactive whiteboard.

Figure 139



Source: ***Survey of Schools: ICT in Education***

The highest levels of **ICT tools use** as reported by students appear to be in primary schools. At grade 8, more than 64% of students reported using multimedia tools (e.g. PowerPoint, video editing, digital recording) daily to several times monthly and almost half said they used exercise software, online quizzes and tests with the same frequency. Digital books and textbooks were used daily or almost every day by 25%.

4.2.4. Teachers' ICT competences

⇨ **At the EU level, between 24% to 31% of students at all grades are taught by teachers for whom participation in ICT training is compulsory.**

At the EU level, only about 25% of students at grades 8 and 11 both in general and vocational education are taught by teachers for whom it is compulsory to participate in some kind of ICT training. Interestingly, the figure is slightly higher for younger students at grade 4 with 31% of them being taught by teachers for whom it is compulsory to partake in some kind of ICT training.

Teacher training in ICT: country patterns

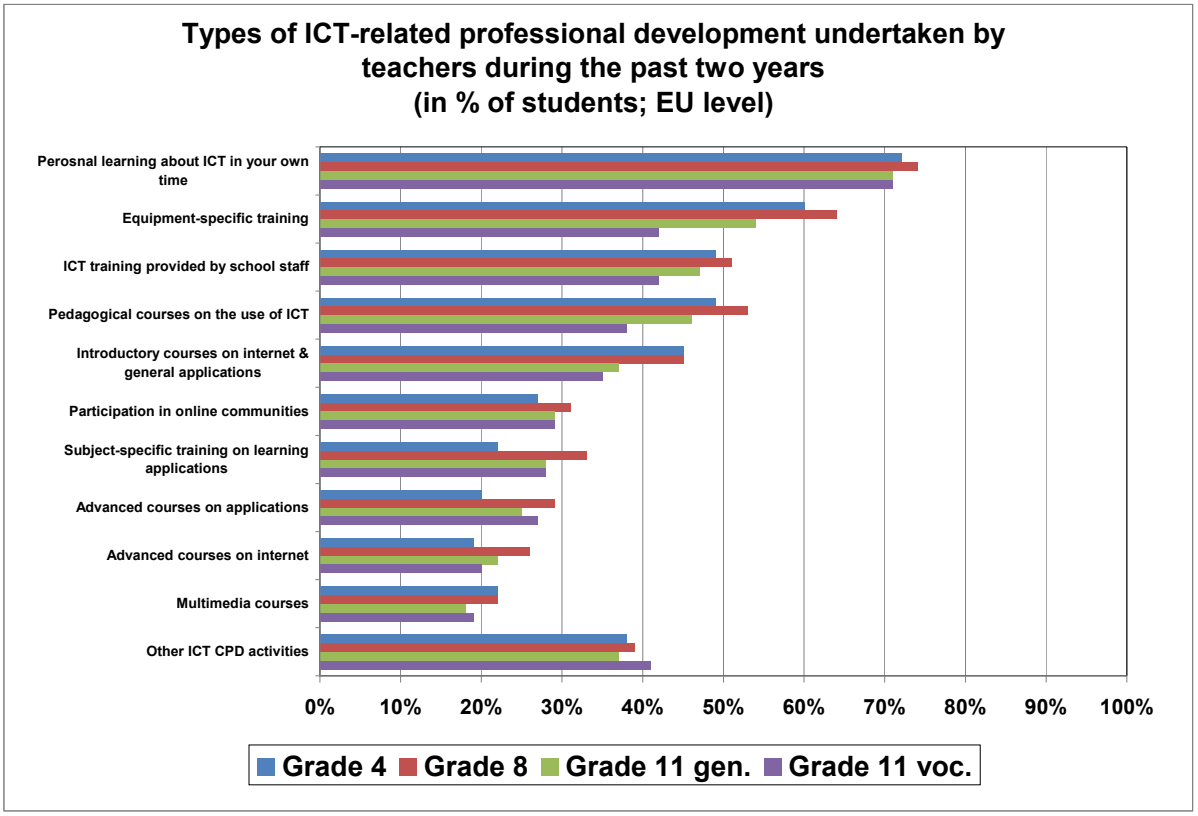
In Lithuania, a high percentage of students (between 74% and 80%) at all grades are taught by teachers for whom it is compulsory to participate in ICT training. Across grades, the percentage is also high in Romania with between 56% and 71% of students taught by teachers who are subject to mandatory ICT training. Conversely, the percentage of students being taught by teachers for whom it is compulsory to participate in ICT training is particularly low at grades 4 and 8 in Luxembourg (below 3%), and is also very low in Austria and Italy, where

only between 4% and 13% of students at all grades are taught by such teachers.

In terms of **teacher training in ICT** at the EU level and depending on the grade concerned it appears that the most common ICT-related professional development undertaken by teachers is carried out as "personal learning on ICT in their own time". The following graph is indicative (

Figure 140):

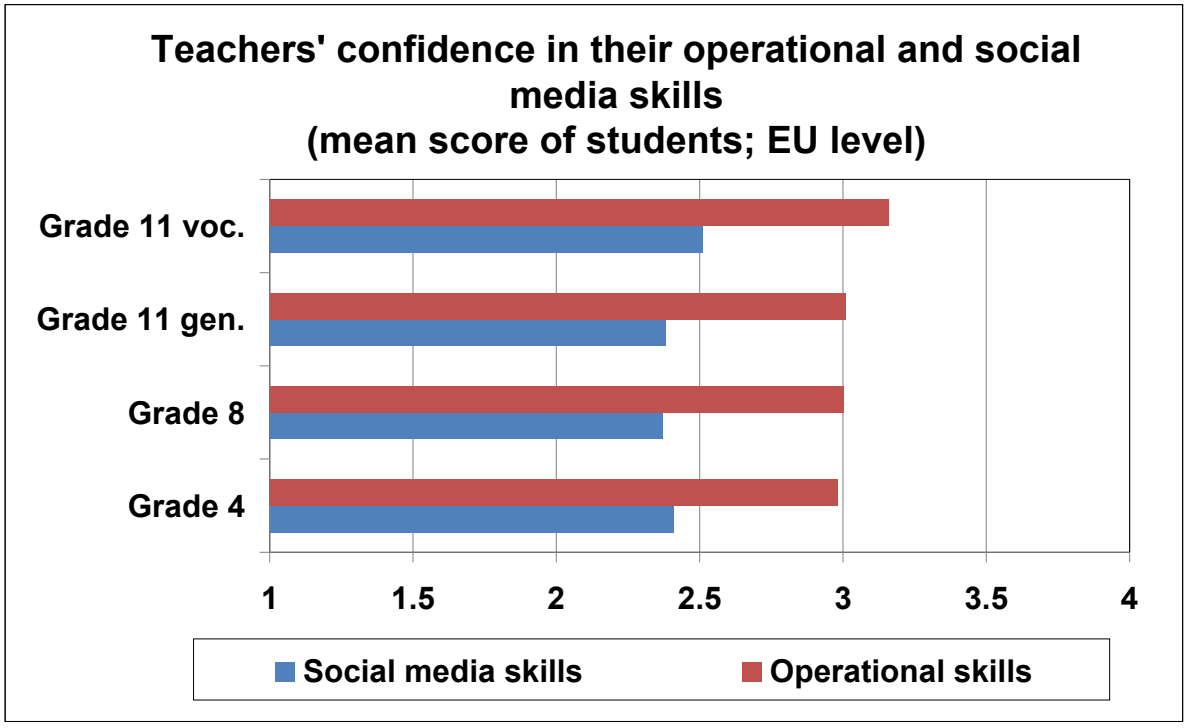
Figure 140: Percentage of students at EU level taught by teachers who have undertaken digital competence related professional development activities during the past two years



Source: *Survey of Schools: ICT in Education*

Teacher confidence in using ICT and the mean score across grades of students taught by teachers declaring confidence in using social media skills is consistently substantially lower than the mean score of students taught by teachers declaring confidence in their operational skills (see Box 4 for definition). The mean scores described in this section are on a scale from 1 to 4 with 1 being 'not at all' and 4 being 'a lot' (Figure 141).

Figure 141



Source: *Survey of Schools: ICT in Education*

Box 4: DEFINITIONS

Operational skills

For the purposes of this survey, operational skills were defined to comprise the following: production of text using a word processing programme; capturing and editing digital photos, movies or other graphics; editing online text containing internet links and images; creating a database; editing a questionnaire online; emailing a file to someone/another student or teacher; organising computer files in folders and sub-folders; using a spreadsheet; using a spreadsheet to plot a graph; creating a presentation with simple animation functions; creating a presentation with video or audio clips; and downloading and installing software onto a computer.

Social media skills

Social media use and activities refer to recent internet tools and practices ranging from social networking and blogging, to "folksonomies" and "mash ups". In a technical sense, Web 2.0 refers to an increased socialisation of internet tools, applications and services, as opposed to a transmission of content from "one to many" in web 1.0.

For the purposes of this survey, social media skills were defined as consisting in the following: the ability to participate in an online discussion forum; the ability to create and maintain blogs or websites; and the ability to participate in social networks.

In general terms, negative **correlations** are observed between teachers' confidence in their skills and the number of years they have been teaching at school as well as their age. By contrast, positive correlations are commonly observed between teachers' confidence in their skills and the number of years they have been using computers and/or the internet at school, their participation in professional development, and the frequency of use of ICT based activities with the target class.

4.2.5. Student confidence in using ICT

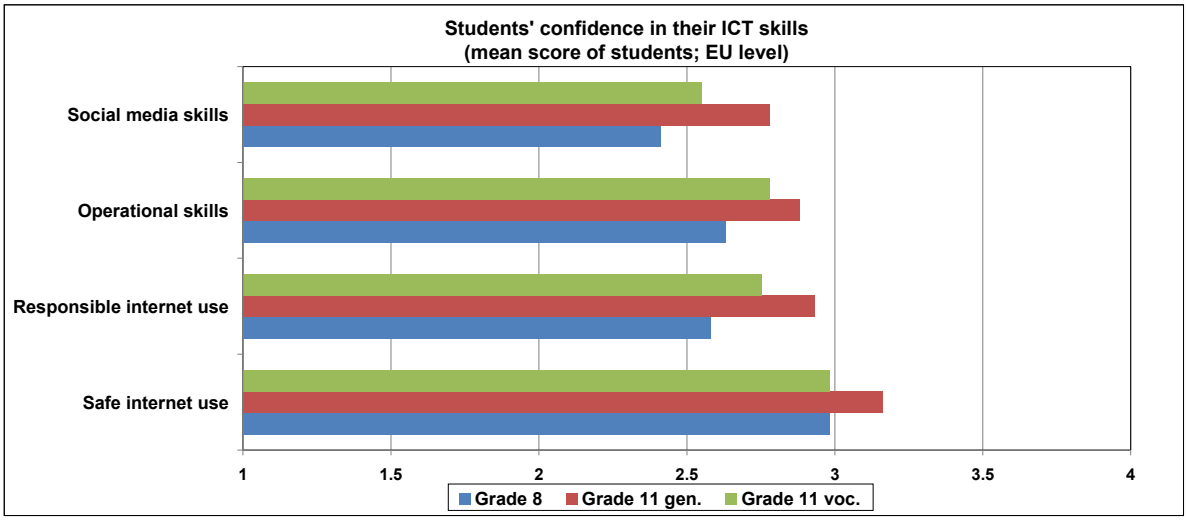
The mean scores described in this section below are on a scale from 1 to 4 (1 being "not at all" and 4 being "a lot").

At the EU level and depending on the grade concerned (Figure 142):

- Regardless of the type of ICT skill in question, the mean score of grade 11 (general education) students in their confidence to use it was consistently the highest (ranging from 2.78 to 3.16) , while the score for grade 8 students was consistently the lowest (ranging from 2.41 to 2.98).
- Students across all grades have a higher mean score (ranging from 2.98 to 3.16) in their confidence to use the internet ethically than in any other ICT skill in which they were asked to express their level of confidence.

- Conversely, students across all grades have a lower mean score (ranging from 2.41 to 2.78) in their confidence to use web 2.0 skills, compared with any other ICT skill, particularly at grade 8.
- Students at grade 8 have a slightly lower mean score (2.63) in their confidence in their own technological skills than grade 11 (general and vocational education) students (2.88 and 2.78 respectively).
- Students at grade 11 (general education) have a rather high mean score (2.93) in their confidence to use the internet responsibly, while this mean score decreases somewhat at grade 11 (vocational education) (2.75), and even more so at grade 8 (2.58).

Figure 142: Mean score of students at EU level expressing confidence in various ICT skills



Source: *Survey of Schools: ICT in Education*

Considering the **attitudes of students towards ICT**, between 71% and 78% of students in the EU at all grades said they regarded using ICT during lessons as having somewhat or a lot of positive impact on concentration, trying harder, understanding, remembering, as well as on independent and on collaborative learning. Around 72% of students also said that using ICT during lessons has somewhat or a lot of positive impact on classroom atmosphere. Still at EU level, around 10% of students considered that using ICT during lessons does not have any positive impact at all on all the above mentioned issues. This result confirms a wide acknowledgment that ICT tools have a positive influence on students' retentive memory, comprehension, attendance and concentration. This is because ICT enhances the use of images and enables interactivity between teachers and students as well as among students themselves.

Box 5: DEFINITIONS

Ethical use of the internet

For the purposes of this survey, the definition of the ethical use of the internet included the ability to use the internet safely to protect their privacy and online reputation, as well as to respect the privacy and online reputation of others. It also included the ability to use the internet to protect oneself against online bullying, spam and junk mail.

Responsible use of the internet

The ability to use the internet responsibly was defined in the following way, for the purposes of this survey: the ability to judge the reliability of information found on the internet; to identify online sources of reliable information; and to use information found on the internet without plagiarising.

Four key cluster analyses explored the relationship between elements of ICT access, use and strategies in schools.

4.2.6. *The digitally supportive school - Policy and support*

A *digitally supportive school* at EU level could be defined as a school where not just policy but, even more importantly, concrete support measures such as training actions, the availability of an ICT coordinator, keeping obstacles to ICT use in T&L (Teaching and Learning) low and positive attitudes from the school head towards ICT use in T&L are present.

school type 1: strong policy & strong support (school type 1);

school type 1: weak policy & strong support (school type 2);

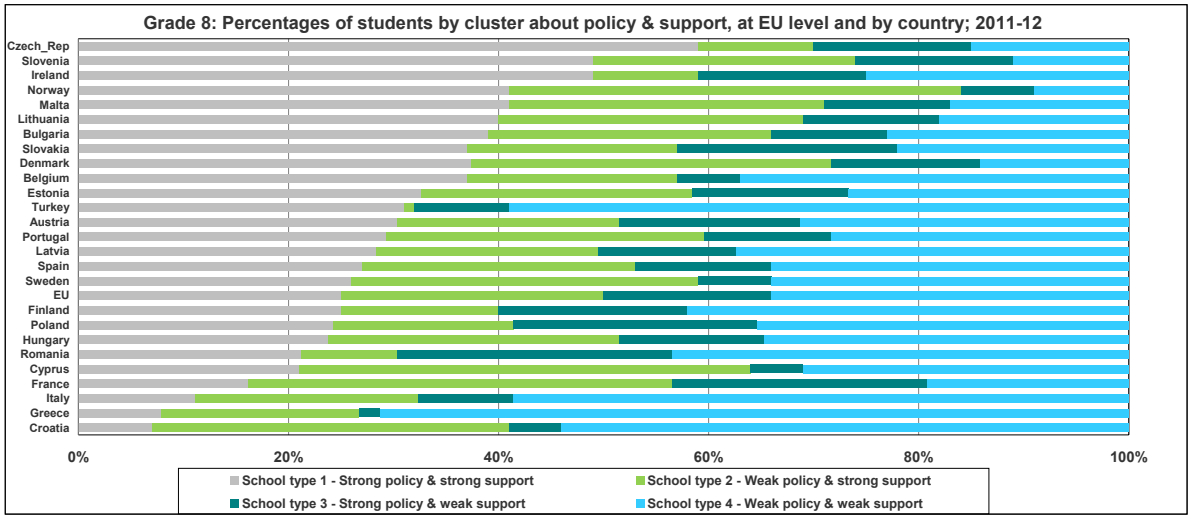
school type 3: strong policy & weak support (school type 3);

school type 4: weak policy & weak support (school type 4).

At EU level:

- At the EU level, around **half of students** go to a *digitally supportive school* having a policy but more importantly concrete support measures in favour of ICT use in T&L; slightly fewer students are in this situation at grade 11;
- around **one third of students** go to a school part of type 1 (strong policy & strong support);
- around **one fifth of students** (a little bit less at grade 11) go to a school part of type 2 (weak policy & strong support);
- around **one third of students** go to a school part of type 4 (weak policy & strong support);
- compared to the other grades, a larger percentage of students – around one third - go to a school part of type 3 (strong policy & weak support).

Figure 143



Source: *Survey of Schools: ICT in Education*

When comparing types of schools at the EU level in terms of student use of ICT (ICT based activities and equipment use), it appears that providing concrete support (teacher training, ICT

coordinator, low obstacles, and school head positive attitudes towards ICT use in T&L) matters more than policies. In fact, higher use (represented by higher mean scores in the graphs), especially related to ICT based activities, is observed in the two types of schools where the support is strong (school type 1 – Strong policy & strong support; school type 2 – Weak policy & strong support).

A similar situation is observed when comparing types of schools in terms of teacher use. Indeed, higher use (represented by higher mean scores in the graph) is observed in school types 1 and 2, at all grades.

4.2.7. The digitally supportive teachers - learning conditions

A *digitally supportive teacher* could be defined as teacher who is positive about ICT and confident and able to use ICT in T&L in an optimum way, even when access conditions are low and obstacles high. A cluster analysis of teacher characteristics (training participation, confidence, opinions and attitudes) as well as their conditions of access to ICT and what they consider as obstacles to ICT use in T&L, reveals four types of learning conditions that can be summarised in the following way:

- high teacher confidence/ attitude & high access/low obstacles (type 1);
- high teacher confidence/ attitude & low access/high obstacles (type 2);
- low teacher confidence/ attitude & high access/low obstacles (type 3);
- low teacher confidence/ attitude & low access/high obstacles (type 4);

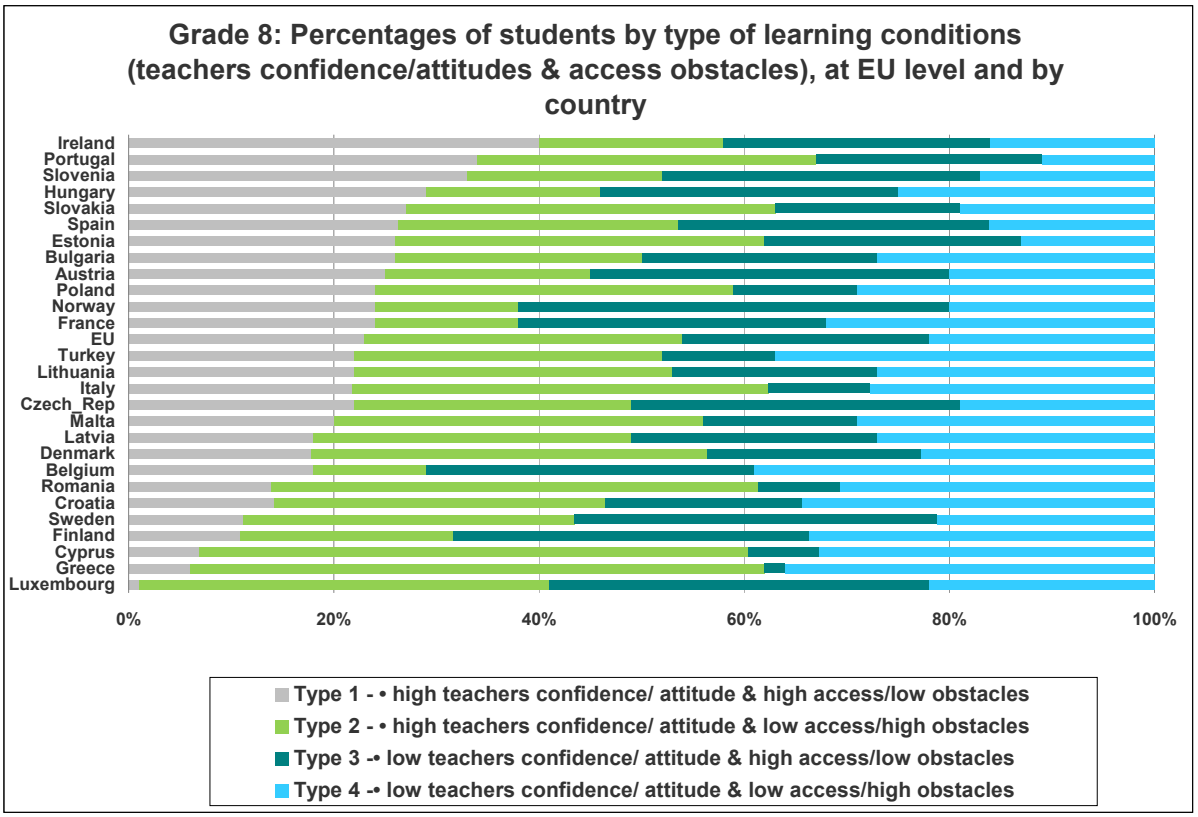
At the EU level:

- At the EU level, a lower percentage of students at grade 4 (around a fifth of students) are taught by teachers with a 'high confidence/attitude & high access/low obstacles' profile compared to grades 8 and 11 (around a quarter of students).
- In addition to the fifth of students at grade 4 and a quarter at the other grades that are offered the type of learning conditions characterised by high teacher confidence/ attitude & high access/low obstacles, around a third of the students (a little bit less at grade 11 in vocational education) are taught by digitally positive teachers who are able to optimise less favourable learning conditions (low access/high obstacles);

Differences between countries are very important:

- In Slovakia and Portugal, around **two thirds of students,** at several but not all grades, are offered learning conditions corresponding to type 1 (high teacher confidence/ attitude & high access/low obstacles) or 2 (high teacher confidence/ attitude & low access/high obstacles)
- In a few countries -- such as Austria, Belgium, Turkey -- and usually only at one specific grade, about no more than a quarter of the students are offered learning conditions corresponding to type 1 or 2, while around half the students are offered learning conditions characterised by low teacher confidence/ attitude & low access/high obstacles.

Figure 144



Source: *Survey of Schools: ICT in Education*

It appears that students taught in learning conditions corresponding to type 1 (high teacher confidence/attitudes & high access/low obstacles) and type 2 (high teacher confidence/attitudes & low access/high obstacles) demonstrate higher frequency of activities compared to students taught in learning conditions corresponding to type 3 (low teacher confidence/attitudes & high access/low obstacles) and type 4 (low teacher confidence/attitudes & low access/high obstacles). In other words, it supports the idea that confident and positive teachers can overcome to a certain extent low access and high obstacles.

When comparing types of learning conditions at the EU level in terms of student use (equipment use and ICT based activities), it appears that students taught in learning conditions corresponding to type 1 (high teacher confidence/attitudes & high access/low obstacles) demonstrate higher frequency of use. When comparing types of learning conditions at the EU level in terms of student confidence in a set of ICT related skills (web 2.0, safe internet use, responsible internet use and operational skills), students' opinions about the positive impact of ICT use in T&L and students' attitudes towards computers, it also appears – but to a lesser extent and less systematically - that students taught in learning conditions corresponding to type 1 (high teacher confidence/attitudes & high access/low obstacles) demonstrate more positive opinions and attitudes. To explain this result, an hypothesis is that confidence and attitudes are probably more influenced by ICT use at home than by use at school.

Students taught in learning conditions corresponding to type 2 (high teacher confidence/attitudes & low access/high obstacles) perform as well, and in some cases even better, than students in type 3 (low teacher confidence/attitudes & low access/high obstacles). This observation suggests that confident and positive teachers are able in a way to overcome low access and high obstacles, using what is available in an optimum way.

In fact, students' higher use and more positive opinions and attitudes (represented by higher mean scores in the graphs) are observed in learning conditions corresponding to type 2 compared to type 3. A similar, but less marked, pattern is observed concerning students' confidence in their various ICT related skills.

4.2.8. The digitally supported student - home / school use of ICT by students

A cluster analysis of access and use characteristics at home and at school during lessons reveals three student profiles that can be summarised in the following way[131]:

- high access/use at school & high access/use at home (profile 1)
- low access/use at school & high access/use at home (profile 2)
- low access/use at school & low access/use at home (profile 3)

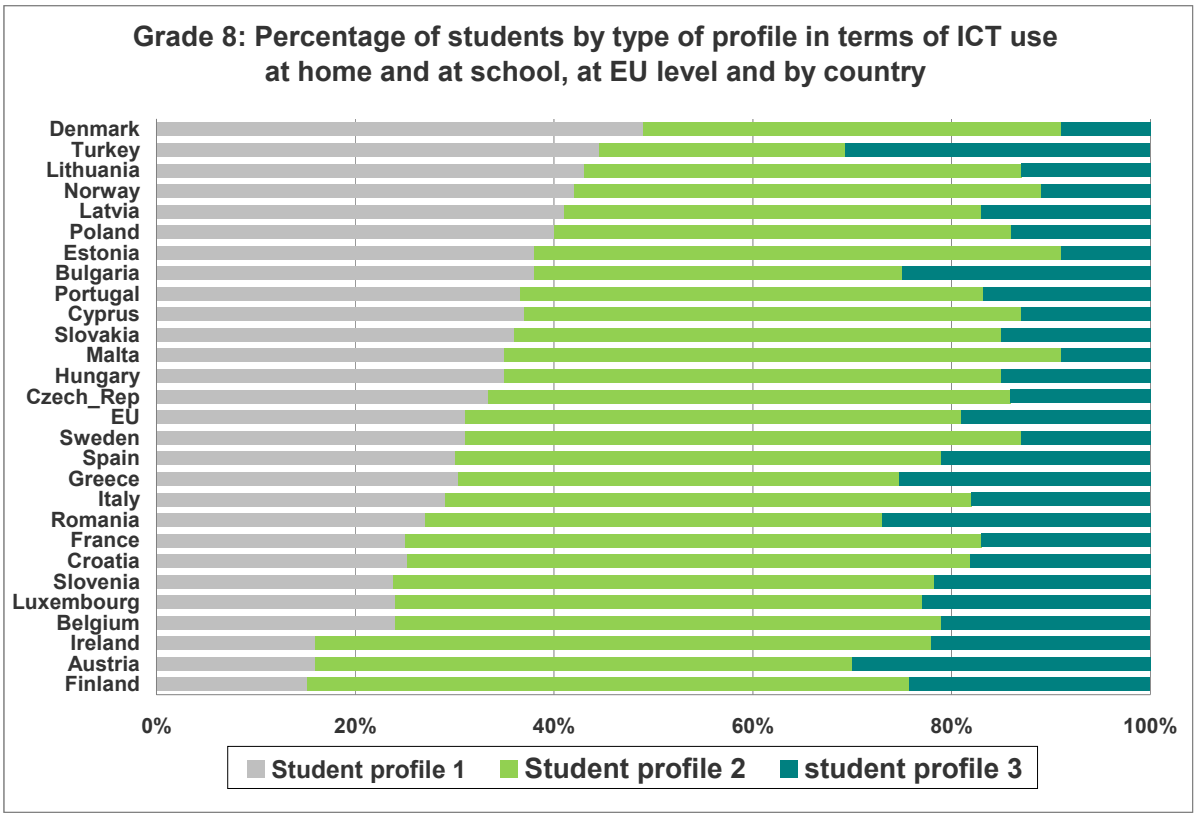
A *digitally supported student* at the EU level could be defined as one who is among the most regular users of ICT based activities in the school, shows the highest levels of confidence in ICT based skills and has the most positive opinions about the impact of ICT on T&L and the most positive attitudes towards computers, associated with a high access/use of ICT at school and at home.

At the EU level, we see that:

- around **one third of students** corresponds to profile 1, i.e. high access/use at school & high access/use at home.
- around **one fifth of students** (and a little bit more at grade 11 in general education) corresponds to profile 3, i.e. low access/use at school & at home.
- a higher percentage of students corresponds to profile 1 (high access/use at school & high access/use at home) at grade 11 in general education compared to vocational education and to grade 8; this could reveal that more attention is dedicated to integrate ICT in T&L at grade 11 in general education
- Unsurprisingly, the largest group of students (about 50%) correspond to profile 2, i.e. having low access/use at school & high access/use at home (at least at grade 8 and 11 vocational).
- Differences between countries are important

[131] The two-steps cluster analysis with SPSS has revealed only three different student's profiles (i.e. those mentioned in the present report) and didn't propose any fourth category corresponding to an hypothetical 'high access/use at school and low access/use at home' that could be observed at all ISCED levels. In other words, no such student profile, different enough from the three others, has been identified among participating students.

Figure 145

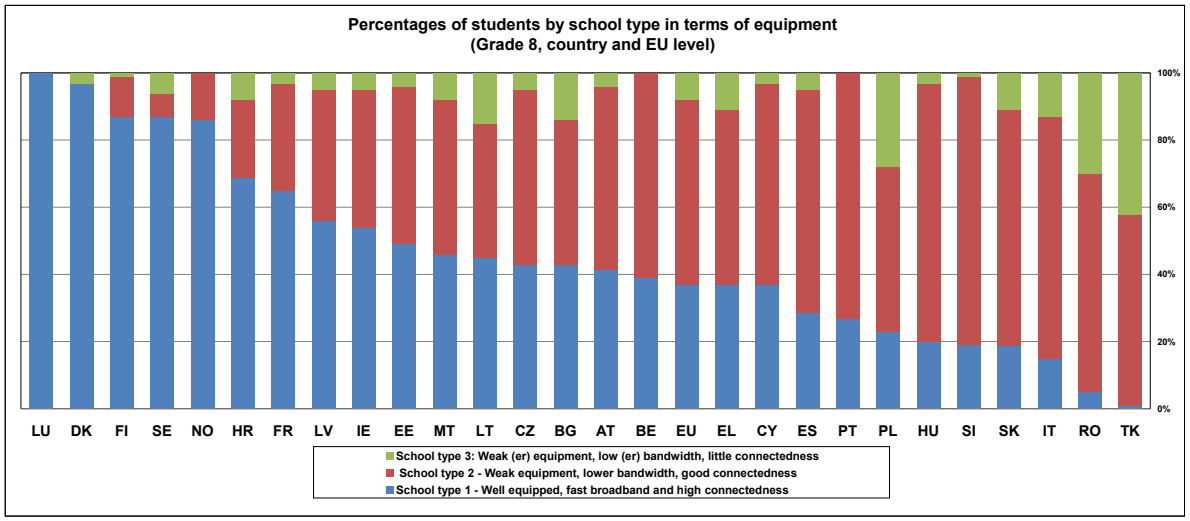


Source: *Survey of Schools: ICT in Education*

4.2.9. The 'e-equipped school'

E-equipped schools have high levels of equipment, connectivity, connectedness (i.e. an online presence in the form of a website, a virtual learning environment, email addressses for students and teachers) and technical support. The chart shows this data for grade 8 students, showing that 37% in the EU as a whole are in schools that are well equipped, have fast broadband and are connected.

Figure 146



Source: *Survey of Schools: ICT in Education*

4.3. Conclusions

This chapter has looked at recent evidence on the EU population's digital competence: "the confident and critical use of ICT for work, leisure, learning and communication".

In 2011, in the EU27 around 75% of households had access to a computer at home and the internet. In some more advanced countries these rates are above 90% and still growing. Among the reasons cited for not having access to the internet, a lack of skills appears as the second most important reason after a lack of interest. In terms of operational computer and internet skills in the EU27, the percentage of computer users having medium and high computer skills is 38%. In addition, countries with a higher rate of computer users tend to have a higher rate of medium and high-skilled people. A similar positive correlation applies to internet skills where on average , the percentage of internet users having medium and high internet skills is 30%.

With regard to the **socio-economic factors associated with digital skills,** correlations are observed between a number of factors: age, gender, educational level, employment status, household income, citizenship, locality, and the level of skills of individuals. Firstly, there is an inverse relationship between the age of individuals and their level of skills. Secondly, the male-female skills gap has been decreasing over time with more and more women acquiring higher levels of digital skills, although for a high level of skills, there is a bigger male-female gap even in younger age groups. Furthermore, education and household income are defining factors of the level of skills, showing a positive correlation, while in urban (densely) populated areas, individuals tend to have higher level of skills than their rural counterparts.However, it must be remarked that despite the positive trends on internet access and usage by the young age group or the so-called *digital natives*, recent research[132] points out a few less positive trends, which need future attention. For example, young people generally lack critical ICT skills; in addition, there is a digital divide in the frequency, the use of internet and in the online risks assumed by young people, which are affected by socio-economic conditions; finally, the ICT skills of young people are inadequate to meet the requirements of the labour market.In terms of **how internet and computer skills were obtained** one in two Europeans reported self-study (learning by doing) and informal assistance from colleagues, relatives and friends, while one in three declared that they obtained their skills from an educational institution (28%). As expected, the older the individual is, the less likely it is that he or she has obtained their skills at school, since the development and increased use of digital tools is a rather recent phenomenon.

When turning to the deployment of ICT in the educational system, data obtained from the *Survey of schools:* ***ICT in Education*** show that the older the students are, the more confident they are in their use of ICT. This applies to a variety of skills including web 2.0 and technological skills. Meanwhile, only one in three students at all grades are taught by teachers for whom participation in ICT training is compulsory. However, it is encouraging that 70% of students at all grades are taught by teachers who have engaged in personal learning about ICT in their own time. In addition, teachers tend to feel more confident in using technological rather than web 2.0 skills.

In summary, there is optimism that Europeans are acquiring higher level of skills over time, despite the fact that there are still strong divides in digital competence both across countries

[132] IPTS study ICTs for disadvantaged youth: Opportunities and Challenges. Evidence from literature and practice, Policy Report, Forthcoming 2012, http://is.jrc.ec.europa.eu/pages/EAP/eInclusion/youth.html

and socio-economic lines. It is essential to increase rates of access and use of ICT as these factors are strongly and positively correlated with the level of digital competence across all countries. Among socio-economic factors, age, gender, and education remain the key challenges. Older people as well as those with lower levels of education tend to have lower digital competence and the same is true for women. Finally, increased attention should be paid to certain countries that are exhibiting low rates in terms of most indicators of digital competence and, as a result, have a high risk of being left behind. These countries are Bulgaria, Cyprus, Greece, and Romania. As a result, 'skilling up' European citizens requires a set of specific and targeted strategies.

To this end, the Commission supports a number of initiatives, such as the Get Online Week and the e-Skills Week. In addition, there is relevant funding available from CIP ICT PSP programme 2012, while significant efforts are underway to improve the competence of ICT practitioners and users in the context of the European Qualifications Framework. Another high-profile program is the "Digital Champions" initiative that was announced recently by the President of the European Commission. The purpose of this program is for every member state to have its own "digital champion" – a high-profile, dynamic and energetic individual responsible for getting everyone in their country online and improving digital skills. The digital champion would work with education authorities, industry, and grassroots activists and would be independent of but reporting to central government. In the longer term perspective, digital literacy is becoming a priority in the European Social Fund (2014-2020) and will be translated into national plans. The European Commission is also launching a "Creative classrooms" initiative, which will help mainstream innovation in learning and teaching and hopefully providing a systemic impact. Moreover, increased attention is given to 'Open Educational Resources' and its contribution to an open sharing of ideas and knowledge.

Finally, the recent policy employment policy communication from the Commission, "Towards a job-rich recovery" (Employment Package), presents the Commission's plans to support job creation and much needed labour market reform in the light of the recession and the protracted sovereign debt crisis. Among others, this Employment Package includes dedicated documents addressing the employment potential of ICT. As part of its new employment strategy, the Commission anounced its intention to establish multi-stakeholder partnerships in ICT for Employment in order to identify skill mismatches, intensify ICT training and raise awareness of the potential of ICT careers. As shown in the above analysis of the Eurostat data, only 43% of Europeans said they are confident that their level of skills is sufficient if they were to look for a job or change job within a year. Such figures need to increase since ICT skills are increasingly important in order to lower unemployment even among senior workers. Besides, the transition to a knowledge based and innovation driven economy suggests that the success of the EU's growth strategy, *Europe 2020*, itself depends largely on the skills, competences and resourcefulness of the European workforce[133].

For example, one econometric study of the Italian labour market, monitoring age and education and following individuals over time, found that low-educated workers aged

[133] The Commission (JRC-IPTS and DG EAC) is also developing a framework for Digital Competence that provides a comprehensive overview of the sub-competences related to digital competence, applicable at all levels of education, including non-formal settings. For more information: http://is.jrc.ec.europa.eu/pages/EAP/DIGCOMP.html

between 35 and 49 with no digital skills have a 5% higher probability of being unemployed than those with digital skills and that highly educated workers aged 50-64 with no digital skills have a 20% higher probability of being unemployed than those with digital skills[134]. ICT can also be used to improve one's skills, whether ICT or otherwise. In the EU, jobs held by highly qualified people in all sectors are expected to rise by 16 million between now and 2020, while those held by low-skilled workers will decline by around 12 million[135].

At the same tim, ICT skills reduce the risk of exclusion among young people. A study on the role of ICT for young people at risk of exclusion[136], relying on a survey of 61 ICT based initiatives for the inclusion of youth at risk, shows that the positive short-term outcomes reported by these initiatives refer inter alia to re-engagement in education and training and re-insertion into employment. The impact of ICT stems from the 'skilling', empowerment and social capital effects of their use, which are all relevant for employability. Another study found that people who have ICT skills on their curriculum vitae increase their probability of receiving a call-back by 1% or more[137].

As a result, for Europe to gain and maintain a competitive advantage in the global economy the 'skilling up' of its population is a key opportunity and challenge that cannot be ignored. Undoubtfully, enhancing digital competence requires a concerted effort both at a European and national level in various areas, such as education, training, enterprise and employment policies, taxation, research, etc.

[134] The dataset used provides four different waves of data (2000, 2002, 2004, and 2006). For the illustration of the dataset see Main Report (Codagnone et al 2009), § 8.2.

[135] "An agenda for new skills and jobs: A European contribution towards full employment" http://europa.eu/rapid/pressReleasesAction.do?reference=IP/10/1541&format=HTML&aged=0&language=EN&guiLanguage=fr

[136] See IPTS study ICTs for disadvantaged youth: Opportunities and challenges, Policy Report, Forthcoming 2012, http://is.jrc.ec.europa.eu/pages/EAP/eInclusion/youth.html

[137] ICT *Skills and Employment: A randomized experiment*, Mariana Blanco (Universidad del Rosario) and Florencia Lopez Boo (Inter-American Development Bank) (November 2010)

5. EGOVERNMENT

- eGovernment usage by citizens (41% in 2011) is stable compared to last year, however this hides significant progress for some smaller countries

- Reasons for non-use of online public services by citizens reside primarily on lack of need, lack of trust and lack of skills. The importance of the latter increases rapidly with age and signals an emerging divide.

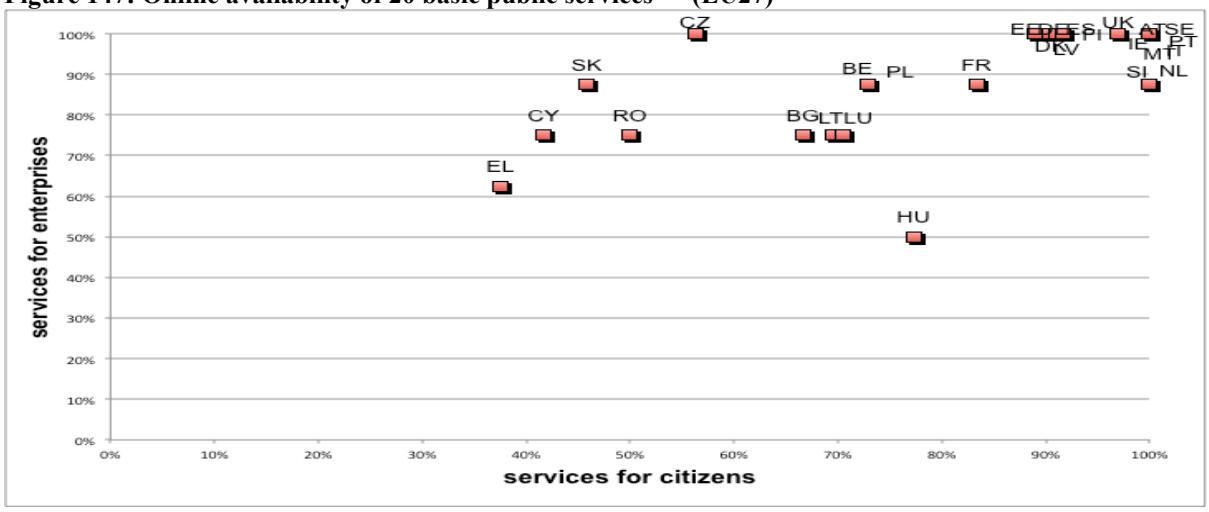
- eGovernment usage by firms has increased steadily from 76% in 2010 to 84% in 2011. EU convergence in rate of use can be observed for large and (to a smaller extent) medium firms, while usage rates for small firms remain quite dispersed.

- Lack of skills is still an important limiting factor in small enterprises but also incomplete digitalisation of public services is an important barrier to an increasing eGovernment take-up.

5.1. Introduction

The 2010 edition of the "EU eGovernment Benchmark Report"[138] shows that availability of online public services is less and less an issue: a wide range of basic services is available in almost all EU27 countries (Figure 147). The use by enterprises has shown an increasing trend. However, the use by citizens remains low and this poses questions and challenges to European policy-makers who want to make the best use of the considerable budget invested until now in digitising their public administrations. These questions need answers more than ever in the current time when budgetary pressure due to the ongoing crisis demands best use of available resources.

Figure 147: Online availability of 20 basic public services[139] (EU27)



Source: CapGemini 'Digitizing Public Services in Europe: Putting ambition into action - 9th Benchmark Measurement', 2010140.

5.2. Use of eGovernment by businesses improves

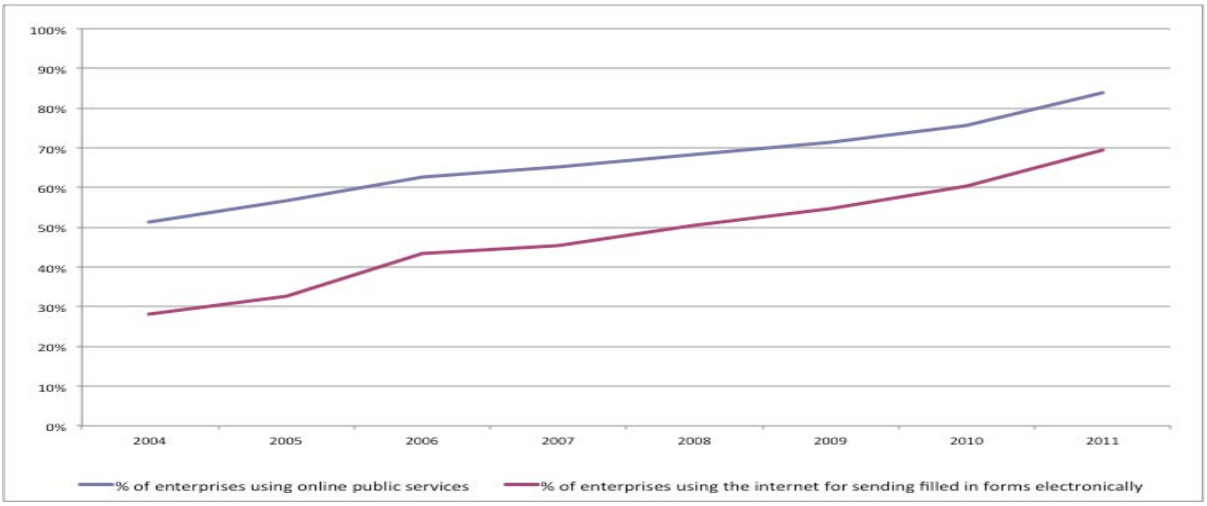
The usage of eGovernment services by enterprises has shown an increasing trend since the beginning of the measurement. The trend has become steeper, reaching 84% of enterprises in 2011 from 76% in 2010 (Figure 148). Usage has also become more sophisticated: in 2011 over 69% of enterprises sent filled-in forms to public administrations via the internet, that is 83% of firms having used online public services (compared to 55% in 2004).

[138] See footnote 133

[139] 'Basic' refers to the 20 services (12 for citizens, 8 for businesses) used to benchmark the online availability of public services (full definition in the 9th eGovernment Benchmark Report, see footnote 3). These are: income taxes, job search, social security benefits, personal documents, car registration, building permissions, declaration to police, public libraries, certificates, enrolment in higher education, announcement of moving, health-related services (citizens), social contributions, corporate tax, VAT, company registration, statistical data, customs declaration, environment-related permits, public procurement (businesses).

[140] This publication constitutes the 9th edition of the European Commission's eGovernment Benchmark Report prepared by CapGemini and available at the following link:
http://ec.europa.eu/information_society/newsroom/cf/item_detail_dae.cfm?item_id=6537

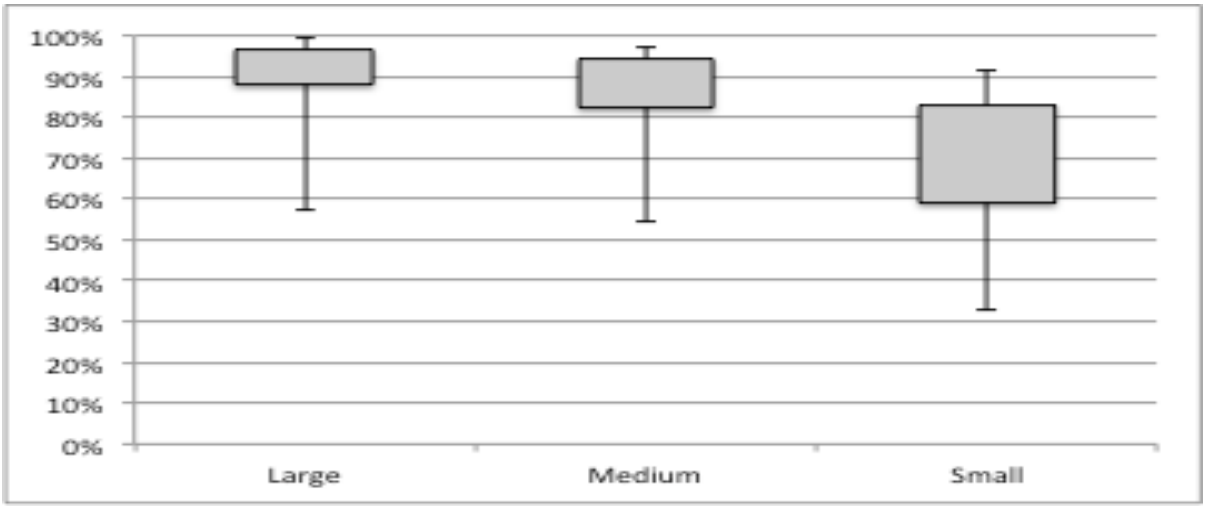
Figure **148: eGovernment usage by enterprises (EU27)**



Source: Eurostat, Community Survey on ICT Usage and eCommerce in Enterprises, 2011

The data on usage of sophisticated interaction with public administrations in the different EU countries and by enterprise size (Figure 149) show very clearly that the process of convergence across EU countries is almost complete for large firms and to a lesser extent for medium-sized firms. Indeed the situation for large firms is better than what emerges from the boxplot: only two countries have percentages below 80%. Small firms on the other hand, display a smaller percentage of advanced users of eGovernment services and a wider dispersion across EU27 countries.

Figure 149: Percentage of enterprises using the internet for sending filled in forms electronically – by firms' size (boxplot* - EU27 countries in 2011)



EU 27 Average	90%	85%	66%

Source: Eurostat, Community Survey on ICT Usage and eCommerce in Enterprises, 2011

*Boxplot: The upper and lower borders of the box contain the values for interactive eGovernment use of the countries in the second and third quartile of the country distribution, while the upper and lower whisker represent the range of variation of, respectively, the first and fourth quartile.

Table 12: Percentage of enterprises sending filled-in forms via the internet for the most common public services, by size class (EU27-2011)

	All	Large	Medium	Small
Declaration of corporate tax	54%	61%	57%	54%
Declaration of customs/excise	31%	51%	41%	28%
Declaration of social contributions for the persons employed	72%	85%	81%	70%
Declaration of VAT	77%	81%	79%	76%
Other services	10%	7%	7%	11%

Source: Eurostat, Community Survey on ICT Usage and eCommerce in Enterprises, 2011

The Eurostat survey on 'ICT usage and eCommerce in Enterprises' in 2011 dedicated a special module to eGovernment use. The answers allowed the identification of the online services most frequently used in an interactive way (i.e. sending filled-in forms). From those responses it emerges that declaration of VAT and declaration of social contributions for employees are the most popular services with a wide diffusion also among small enterprises (Table 12). On the other hand, declaration of corporate tax and especially declaration of customs are relatively less diffused than other services. For the latter the difference in enterprise size is relevant as small enterprises are less likely to be exporters. Finally, other services are far less used than the four mentioned above.

5.3. Barriers to eGovernment adoption in enterprises depend on enterprise's size

The special module helped spread more light on barriers to usage. The incomplete transfer to the online channel of all procedures linked to a particular service is cited by enterprises as the most relevant barrier limiting the increase of online interaction with public administrations (Table 13). Too complicated and/or time-consuming services are the second largest barrier to increased usage but the relative importance of this cause is very much dependent on an enterprise's size. Since larger enterprises have most likely specialised personnel that deals with public administrations, they possess better skills to help them deal with complicated administrative forms. On the other hand, small enterprises not counting on specialised employees suffer most from a lack of user-friendly services. More awareness about availability of services could still boost usage, according to one fifth of enterprises already using interactive online public services and from one quarter (large enterprises) to one third (small enterprises) of enterprises not using them. Data confidentiality and security is not a major concern for both enterprises sending and not sending filled-in forms and this view is homogeneously distributed across enterprise sizes.

By looking at the correlations between the relevance of the barriers and the percentage of enterprises that do not return filled-in forms online (figures in brackets in Table 13), the relative importance of the barriers is confirmed with only two additional remarks. First, since awareness is the logical premise to usage, it is not surprising that it has the highest correlation among large enterprises, which have a low percentage of non-users and for which the other barriers should be less insurmountable than for SMEs. Secondly, all the correlations displayed are higher for medium-sized enterprises than for small enterprises. This could mean that many small enterprises find it more cost efficient to outsource their administrative paperwork in any case and therefore the lowering of barriers could have smaller effects on their take-up rate. On

the other hand, medium enterprises have more specialised administrative staff, which could be very responsive to a quality improvement of public websites like the setting up of life events[141] completely online or an improvement of the user interface.

Table 13: Reasons limiting electronic interaction with public authorities (multiple answers are possible) (EU27 – 2011, enterprises with internet access) and correlation with percentage of firms not returning filled in forms

	enterprises returning filled in forms			enterprises not returning filled in forms		
	Large	Medium	Small	Large	Medium	Small
Lack of awareness of available electronic procedures	20%	20%	23%	26% (37%)	28% (31%)	34% (33%)
Electronic procedures are too complicated and/or too time consuming	20%	23%	28%	27% (20%)	30% (67%)	39% (52%)
Electronic procedures still require exchange of paper mail or personal visits	32%	31%	32%	34% (15%)	37% (61%)	39% (45%)
Concerns related to data confidentiality and security	18%	18%	20%	25% (9%)	26% (45%)	28% (44%)

Source: Eurostat, Community Survey on ICT Usage and eCommerce in Enterprises, 2011.

5.4. eProcurement diffusion in the EU27 is still low

The submission of online tender offers for public calls (eTendering) in the EU27 countries (Figure 150) remains quite low: on average, as the 2011 Eurostat Survey on ICT Usage and eCommerce in Enterprises shows, only 11% of enterprises did that. However, there are some positive exceptions with four countries displaying eTendering percentages above 20% (Ireland, Lithuania, Poland and Slovakia). Still lower is the percentage of enterprises that did cross-border eProcurement; only 2% of EU27 enterprises. Conversely, the percentage of enterprises accessing tender documents via the internet is only around 21% in the EU27, a much lower figure than what could reasonably be expected given that the publication of tenders online is mandatory for all the public procurement contracts above a certain threshold[142] and given the diffusion of the internet in enterprises.

The limited take-up of eProcurement does not seem to be entirely justified by the specialisation pattern of enterprises: just 50% of businesses not doing eTendering give as a reason the fact that the public sector is not a customer for the enterprise[143]. Moreover, only 32% of these firms gave this as the only reason, signaling that eliminating other barriers to the use of eProcurement would increase the number of companies participating in public tenders.

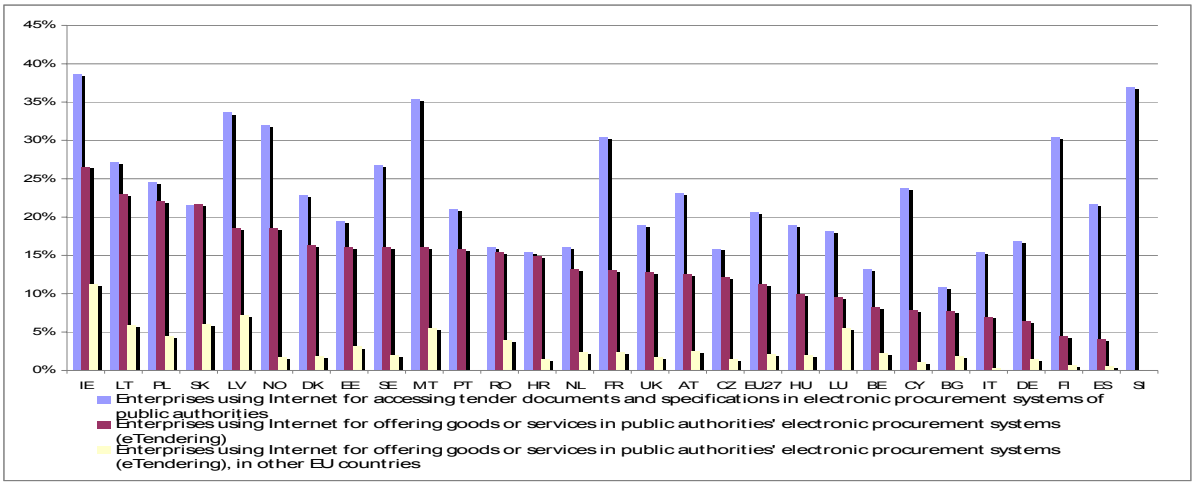
[141] Life events are package government services which are usually provided by multiple government agencies around a subject that makes sense to the citizen or business.

[142] The threshold varies by type of contract. For service contracts the threshold is currently EUR 200,000

[143] This and the following statistics are calculated as a simple average (not weighted) for the statistics of 11 EU countries that were asked a question on reasons for not using eTendering.

Other barriers to eProcurement cited by enterprises that did not use eTendering are lack of awareness (26% of enterprises), concerns related to confidentiality and security (10% of enterprises) and other reasons (29% of enterprises).

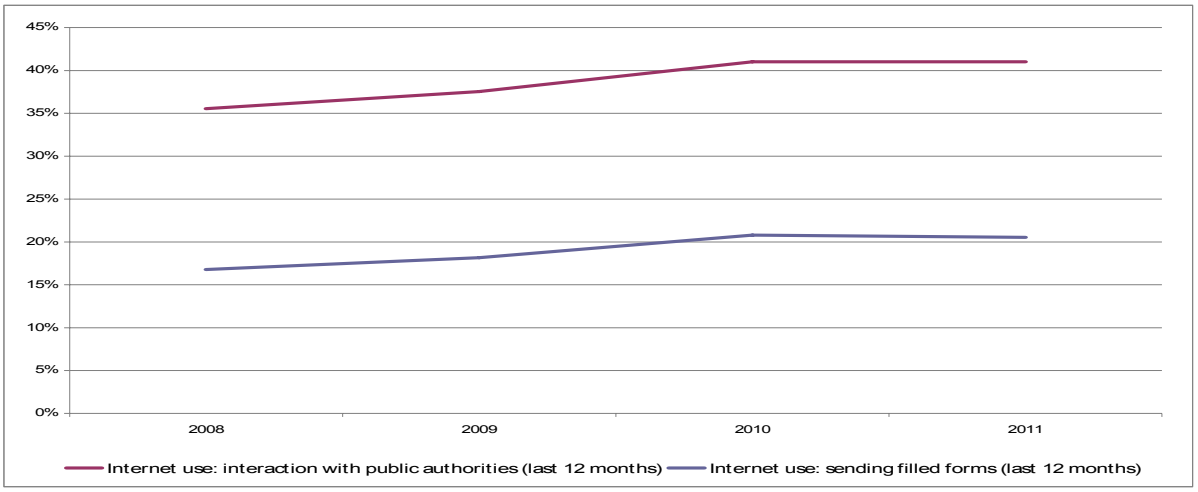
Figure **150: Public eProcurement adoption by enterprises (2011)**



Source: Eurostat, Community Survey on ICT Usage and eCommerce in Enterprises, 2011.

5.5. Use of eGovernment by citizens is stalling

Figure 151: eGovernment usage by citizens (EU27)



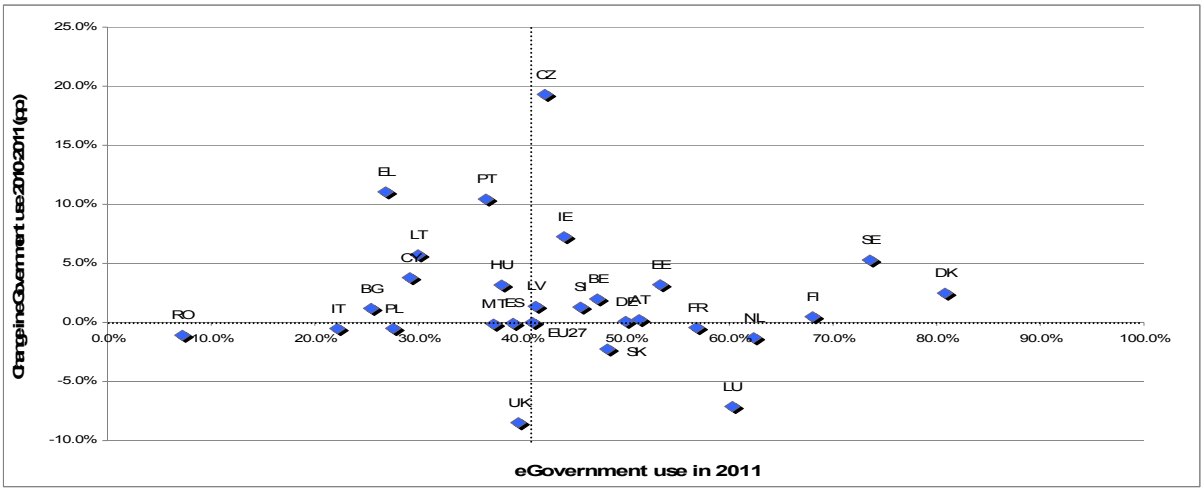
Source: Eurostat, Community Survey on ICT Use in Households and by Individuals, 2011.

After some years of gradual progress, the number of citizens using online public services stalled in 2011 when only 41% of EU citizens used them, as in 2010 (Figure 151)[144]. This can be explained in part by the slowdown in the increase of internet use. Also, more sophisticated use of eGovernment has not improved in the past year; the number of citizens sending filled-in forms to public administrations through the internet remains at 21 % in the EU. However, when looking at country figures, the picture is more varied (Figure 152): most of the countries and, among them some of the more populous (Germany, Italy, Spain, Portugal) show almost no variation with respect to 2010. Conversely, one large country, the UK, shows a significant negative variation with -8.5 percentage points. Only Slovakia and Luxembourg show

[144] The 2011 dismal performance is explained mainly by the retraction in one large MS, UK (see below in the main text).

significant negative variations besides the above mentioned countries while a few countries display significant positive variations above 5 percentage points (the Czech Republic, Greece, Portugal, Ireland, Lithuania, and Sweden). Some of these increases reflect changes in policies, like the introduction of new services which have been made mandatory for the large part of users (the Czech Republic) but usually come from countries with well below average use and therefore may reflect some catching-up. It is also interesting to note that the two countries with the highest percentage of eGovernment users (Denmark and Sweden), in theory close to saturation (taking into account that eGovernment services are mostly useful to the middle-age population), still display significant increases: +5.3 percentage points for Sweden and +2.5 percentage points for Denmark.

Figure 152: eGovernment usage by individuals in 2011 and 2010-2011 difference in usage (in pp.)



Source: Eurostat, Community Survey on ICT Use in Households and by Individuals, 2010 & 2011.

Table 14 summarizes the main reasons why people have not used the internet to send filled-in forms to public administrations (EU27 average for 2011). By far the most important reason for not using the internet for interacting for public administrations is lack of need and that is particularly true, for obvious reasons, for young people and, to a lesser extent, for older people. The second most important reason across all age categories relates to concerns about security of personal data while lack of skills for interacting with the public websites ranks third. This is a clear manifestation of the digital divide: younger generations feel less concerned about the protection of their personal data and/or trust the internet more on that issue. Younger people also find interacting less difficult than their older counterparts. This is of great interest to policy makers since it suggests that the main routes to increasing use of these online services lies in implementing more user-friendly services on one hand, and increasing digital skills of the older (and less educated) citizens on the other hand. Finally, the figures for the other reasons suggest that lack of supply of services and technical performance of the public websites are not major issues.

Table 14: Reasons for not using the internet to return filled- in forms to public administrations by age group (multiple answers are possible[145]) (EU27 – 2011, % of internet users in the 12 months that did not send filled in forms)

	16-24 years	25-54 years	55-74 years

[145] Multiple answers are possible except for the first reason (did not have to submit forms at all) where a positive reply here excludes any other reason

	old	old	old
because I did not have to submit official forms at all	72.2%	56.3%	52.1%
because of concerns about protection and security of personal data	4.7%	11.3%	14.0%
because I did not know how to use website or use was too complicated	2.4%	7.7%	14.5%
because of technical failure of website during filling-in or sending-in the form	1.0%	1.9%	2.4%
because there was no such website service available	3.1%	4.5%	2.8%
because of other reasons	14.8%	18.4%	17.0%

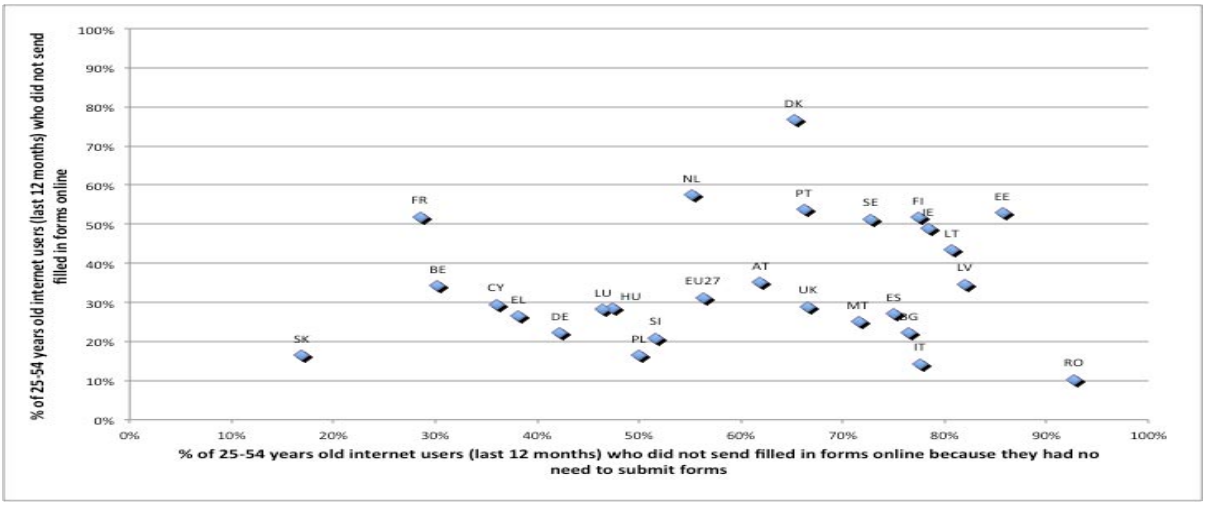
Source: Eurostat, Community Survey on ICT Use in Households and by Individuals, 2011.

Country data, however, show that lack of supply of services is as compelling a reason for more than 5% of non users in Denmark (9.9%), Slovenia (6.6%), Finland (5.5%), Hungary (5.3%) and Luxembourg (5.3%).

Lack of need as a reason for non-use shows large variation across countries[146] and does not show a correlation with levels of use (Figure 153). This calls for different interpretations and solutions for the dispersion of rates of eGovernment use. For the countries on the right-hand side of Figure 152, there are very different levels of non-users but the main driver for the lack of use is the lack of need. A plausible explanation lies in the different activity rates of the working age population: some countries like Malta and Italy display very low activity rates and eGovernment use levels while countries like Denmark and the Netherlands have higher levels of both. Citizens that have a job have usually more frequent interactions with the public authorities. Another explanation for countries in the lower-right quadrant of Figure 6 could be the presence of highly bureaucratic public administrations where the interactions with citizens are dealt with mainly by specialised intermediaries and where availability of online solutions does not do much to lessen the complexity of the interactions. Therefore, for countries in the lower-right quadrant, the policies needed are of a more general nature while countries in the upper-right quadrant are close to saturation and no specific action is needed. On the converse, countries in the lower-left quadrant signal the presence of more specific problems, sometimes different from each other. Citizens from Denmark and France fear for the security of their personal data on average twice as frequently as their EU27 counterparts while lack of skills is a major concern for Portugal, France, EL, and Czech citizens (also on average more than twice than in the EU27). An additional element to take into account is that in some Member States a number of services are delivered automatically without any intervention on the part of the citizen.

[146] The figures for the 25-54 age class are used here to avoid imputing variations exclusively to the demographic structure of a country. CZ data are not available for this breakdown

Figure 153: % of non-users of online public services indicating no-need as reason for non-use vs. % of non-users of online public services (25-54 years old citizens who used internet in the last 12 months).



Source: Eurostat, Community Survey on ICT Use in Households and by Individuals, 2011.

5.6. Conclusions

The availability of online public services is no longer a major issue in most EU countries. Lack of awareness explains most of the perceptions about non-availability of service, as comparisons within countries across firms of different size or citizens of different age groups/education seem to suggest. Then what are the causes of the still low up-take of (interactive) eGovernment services by citizens and enterprises surfacing from data?

The supply side is not exempted from blame: mere availability does not translate into usability of services. Long and complicated procedures and incomplete digitalisation of services still limit the routine use of eGovernment by a considerable part of the population, usually the disadvantaged groups (the elderly and those with a lower level of education). SMEs suffer as well (and medium-sized firms in particular) from the imperfect digitalisation of public services and significant economic gains could be made from the full exploitation of the online channel. These issues are typical of public administrations whose services are still built according to their institutional set-up (administration-centric approach) rather than according to the user's need (user-centric approach).

The EU eGovernment Action Plan 2011-2015 which sets common goals for the EU countries' public administrations for the coming years is moving toward a more user-centric approach, empowering users to make the best use of tools available to them. This means personalised services, automated services, collaborative services, user-friendly services and better transparency.

The Action Plan also sets out priorities to lower the administrative burden for EU enterprises, especially for smaller ones for which the burden is higher, through a more effective use of eGovernment.

The development of the Internal Market is still immature in some areas like eProcurement as described in Section 5.4. Some EU initiatives, such as the PEPPOL[147] large scale pilot, represent efforts to make eGovernment services interoperable across countries. In addition, other large scale pilots in the fields of eJustice, eHealth, business mobility and the recognition

[147] PEPPOL (Pan-European Public Procurement Online) (http://www.peppol.eu).

of eIDs aim to increase the take up of cross border on-line services by making them available and by providing the necessary building blocks on which future services can be developed.

However, not all of the differences in eGovernment use can be attributed to specificities of the sector: the above analysis and the strong correlation between eGovernment country rankings and other rankings on internet coverage, internet activity and internet skills signal that the solution to low uptake must necessarily be an integrated one, involving investments in infrastructure as well as in training and awareness campaigns. Only in this way can the investments made up to now in the digitalisation of public administrations attain their full productivity with beneficial effects for administrations themselves, citizens, enterprises and the society at large.

A number of Member States are taking measures to place the online channel on an equal footing with the physical channel. Some are even moving towards making online the default channel for certain services, such as the UK and Denmark.