SIBIS
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Statistical Indicators Benchmarking the Information Society

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eEurope 2005 Key Figures for Benchmarking EU15

by

DATABANK CONSULTING

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Information Society Technologies

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Introduction

What SIBIS is about

Statistical Indicators Benchmarking the Information Society (SIBIS) is an Information Society Technology (IST) Programme project that has produced new methods and data that will contribute to the European effort to measure and benchmark the Information Society, and to monitor the effectiveness of policies aimed at supporting its development. As the Information Society extends to all aspects of social and economic life, indicators are needed to track not only the technological infrastructure development, but also the impacts on individuals, organisations, industries, and economies.

SIBIS has approached the task of developing and testing such indicators in a systematic manner. It started with a comprehensive assessment of the state-of-the-art in Information Society benchmarking, undertaking extensive reviews of National Statistic Offices across all member states. In addition to indicators which have been used for actual benchmarking purposes, SIBIS collected and analysed other indicators utilised in small-scale and non-representative studies as well as other ones that have been proposed but not yet tested or applied in practice.
From reviewing the corpus of indicator literature, a core set of "SIBIS" indicators were then developed, with the emphasis on those aspects of the Information Society that have been the focus of attention in the **eEurope** context. These indicators were tested and applied in benchmarking surveys in EU Member States, Switzerland and US.

From eEurope 2002 to eEurope 2005

The eEurope 2002 Action Plan was endorsed at the Feira European Council in June 2000 as part of the decade-long Lisbon strategy of economic, social and environmental renewal. The Action Plan set out 11 actions areas in which there were a total of 64 targets to be achieved by the end of 2002.
These targets have been monitored regularly through the benchmarking exercise, and the results achieved have been presented in the eEurope 2002 Final Report. This report shows that, with the joint effort of all the stakeholders, eEurope has already delivered major changes and increased the number of enterprises and individuals connected to the Internet. Although the goal of a competitive knowledge based economy is still some distance away, the basis is laid.

In April 2002, a new plan, the eEurope 2005 Action Plan, was launched by the European Commission. The goals set by eEurope 2005 represent a shift from a quantitative set of goals to a more qualitative one, with the aim to stimulate secure services, applications, and content based on a widely available broadband infrastructure. Emphasis within eEurope 2005 is about putting users at its centre, enabling improved enterprise productivity and growth and bringing with it employment and social cohesion through conveying to *all* citizens the benefits of the Information Society. To achieve these targets, the Action plan comprises four separate but interlinked tools: policy measures, the exchange of good practices, the **benchmarking** of the progress made and an overall co-ordination of existing policies.

SIBIS's contribution to the benchmarking exercise within eEurope 2005

In November 2002, the European Commission published a proposed set of benchmarking indicators for the eEurope 2005 Action Plan, which were endorsed at the meeting of the Telecommunications Council on 5 December 2002. These indicators have a specific emphasis on the measurement of the Internet and broadband use[1]. This extremely important topic forms the basis for the understanding a wide range of other indicators that are covering key vertical topics of interest such as public services, e-business and e-commerce, to name but a few. The Internet and broadband are horizontal in nature, and are enablers that allow other areas of the Information Society to develop.

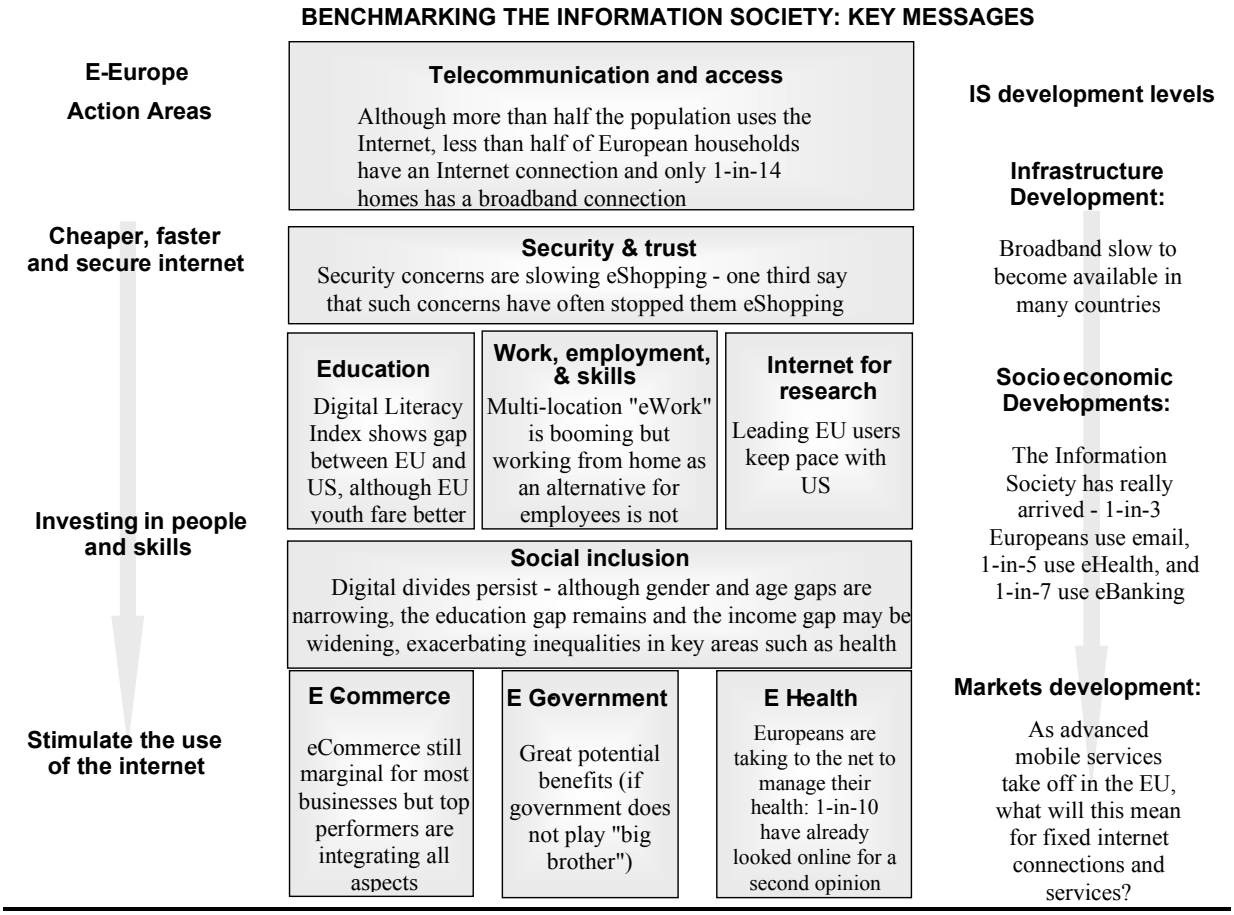
The new approach to benchmarking, which is being undertaken by the Commission, bears many similarities to the current approach taken by the SIBIS project. Through SIBIS, the indicators that have been developed to track telecommunications and access have a strong focus on the Internet and broadband.

This report directly contributes to the eEurope benchmarking exercise as it presents data corresponding to and/or complementing the indicators requested by the Commission for benchmarking eEurope 2005.

How eEurope 2002 and 2005, and SIBIS interrelate is represented below (Figure 0.1), with the key messages of SIBIS also being portrayed.

[1] Other key areas include online public services, the e-business environment and information security

Figure 0.1 Benchmarking the Information Society: Key Messages



Source: Databank Consulting

The Survey

Within the SIBIS project, indicators were tested and applied in two benchmarking surveys. The general population survey (GPS) was undertaken in all EU Member States, in the US and Switzerland, allowing these countries to be benchmarked by exactly the same set of indicators. This is a moot point, as the US often sets the standard in ICTs as it represents the world's most intensive Information Society. The survey fieldwork was carried out in April – May 2002, and involved a total sample of 11,832 respondents.

The second survey, focussed on enterprises (the Decision Maker Survey, DMS), and was undertaken in seven member states, including the five largest Member States (Germany, UK, France, Italy and Spain) as well as Finland, expected to be an information society frontrunner, and Greece, expected to be less well advanced. Also undertaken in April – May 2002, the survey reached 3,139 respondents.

Structure of the report

The report is set out according to the five broad categories of the eEurope 2005 actions: Internet indicators, modern online public services comprising e-government, e-learning and e-health services, a dynamic business environment, broadband and security. Each section briefly introduces the goals of the eEurope 2005 indicators, and current policy actions/activities. From here, the mapping of SIBIS generated indicators to the eEurope ones are discussed, outlining where, why, and how the indicators are different; with assessment on the relevance of those differences. Within each indicator section, the results are presented with accompanying discussion on the validity and consequences of the results (in terms of progress and policy actions). Where relevant, a comparison with the results of eEurope 2002 Final Report is also provided.
Also, methodological findings as a result of SIBIS, and its contribution to indicator development are presented.

Future work

eEurope 2002 also examined the implications of the enlargement of the Union, and advised that from 2004 onwards benchmarking will need to take into account the particular needs of the candidate countries. As a consequence of this, accession countries will also be invited to take part in Eurostat surveys from 2003, as well as additional Commission-run surveys. This is where SIBIS provides a timely and needed contribution. SIBIS+[2] will provide a perspective on the accession countries position with respect to eEurope. Results from those surveys are due by June 2003, and will provide an interesting and necessary perspective on the opportunities and challenges facing the newly associated states.

[2] see www.sibis.org for further information. The accession countries are covered within SIBIS+, detailing….

1. Summary of the results

The results of SIBIS confirm that the Information Society really has arrived. Most European businesses are online to some degree and more than a half the adult population uses the Internet on a regular or occasional basis. However, the Information Society has been slow to arrive in some Member States; Greece and Portugal in particular, but also Spain, Italy and France lag behind the rest of Europe in many respects. Comparatively low levels of digital literacy amongst the younger age groups in some of these countries suggest that catching up may be difficult without targeted interventions. Digital divides also persist across demographic and socio-economic groups. Older people, the less educated and those in unfavourable socio-economic circumstances are all a lot less likely to have access to or to use the new services of the Information Society. Men are also more likely to be online than women, although the gender divide is declining and is much reduced amongst the younger age group. On most indicators of the Information Society, the EU lags behind the US. Europeans are less likely to have home access to the Internet, to use it regularly and to do things online. Even the frontrunners in Europe lag behind the US on most indicators. A clear pattern was apparent across countries - as Internet penetration increases so does the likelihood that Internet users will do things like shopping, banking and health management online. In other words, the more advanced countries are characterised not just by having more people online but also by the fact that those who are online are more likely to be gaining practical benefits from this.

1.1. Internet access

Citizen access: Internet access and use are rising, but a significant proportion of EU citizens still do not access the Internet from any location

SIBIS confirms the continuation of a core trend towards increasing penetration of the Information Society in everyday activities. More than half (54.4%) of the EU population aged 15 years and older used the Internet within the 12 months prior to the survey, up over 4% from 2001. Also, just under one half (46.4%) of the population used it in the 4 weeks prior to the survey.
This is supported by citizens accessing the Internet at home, which over the last two years has shown a 1% month on month growth, a rise from 18% in March 2000 to 44.1% in May 2002 (this compares to 42.6% for the Eurobarometer survey, Nov 2002). This is still someway behind the US (63.5%), although there are some leading countries in the EU15 which surpass the US penetration rates, such as the Netherlands and Sweden, with Denmark closing the gap. Moreover, *intensity* of usage is particularly interesting: distinguishing between *regular*, *occasional*, *offline* PC users and *non-users* produces an encouraging trend that users access the Internet in most EU15 countries regularly. Nevertheless, there are still nearly 40% of EU15 citizens who do not access the Internet at all (compared to the US's 22%). This is particularly true in Mediterranean countries, where over 45% citizens do not access the Internet from any location. SIBIS also shows data that confirms that most users access the Internet principally from home. However, although the reference is to access the Internet at home, the data also shows that there are established patterns of 'bimodal usage' as many users appear to access the Internet from more than one location. In the US as in Scandinavian countries, the UK and the Netherlands there is a large proportion of these 'bimodal users' who access the Internet both at home and at work.

Within eEurope2005 great store is put by the use of alternate platforms – expanding the pervasiveness of the information society beyond the realms of PCs. Whilst the EU has made good progress in alternate platforms, users at home in the US are consistently accessing the Internet through more diversified platforms than those in the EU. This is particularly true for PDA/Palmtop and digital television access, with the US being four and two times as high as the EU, respectively.

On the contrary though, mobile phones usage in the EU shows higher rates of WAP Internet access than the US (a similar pattern is repeated for text messaging (SMS) in Europe).

Experience, tenure and migration to alternate platforms are increasing, but so too are educational and income divides

The location of Internet access has significant implication on the type of information/services sourced online, especially involving financial/health activities. SIBIS showed that in terms of access locations, the EU has a similar profile to the US (at home, work, and educational institution), with the exception of Public Internet Access Points (PIAPs). Figures revealed that 9% use a free PIAP (compared to the US's 12%), but Europe has more citizens accessing a charged PIAP at 6% (2% for the US). Usage rates appear to be *tempered* by the differences among the PIAPs (e.g. they differ in terms of the level of support being provided), and reflect the differential rates of home access across Member States, and are therefore an important element of the IS landscape. This is especially true when considering the socio-economic profile of those users.

SIBIS examined other indicators not included in eEurope 2005, which the research considered an interesting feature of the dynamics of Internet access. The first was online tenure, classified into four bands (< 6 months, > 6 months < 2 years, > 2 years). On-line tenure was highest in the US, Scandinavian countries, Germany and the UK, and generally lower in the Mediterranean countries. On-line tenure was found to be an important indicator because depending on how experienced users are with the Internet, they were more likely to navigate the Internet more effectively, and be more willing to migrate to a broadband connection.
As well as actual barriers (cost, technology, etc.) perceived barriers are still important issues to be overcome in Europe. SIBIS investigated the *perceived incompatibility* between oneself and the Internet through examining concerns about the mismatch between the level of skills required and those [not] possessed by EU citizens. The results showed that Europeans perceive a higher mismatch in relation to their skills than their US counterparts. However, there is a significant variation in perception among the EU's countries, with Nordic countries leading and Portugal and Greece at the tail end. As such there are policy areas which need addressing, such as education, especially for the remaining *hardcore* 45% of non-Internet users.

SIBIS also considered societal exclusion, or the digital divide in the IS, with analysis indicating that gender (a 14% differential between the sexes) those with lower income levels (52% across the 4 income classifications), the unemployed (18%), and older citizens (46% differential between 15-49 and 50+ years) appear to have more preconceptions or face more barriers to accessing the Internet. Within Europe there were mixed trends with respect to the digital divide: with age and gender the gap is closing, however, within education and income the gap has widened since 1997. As for gender gap, however, the Eurobarometer Survey (Nov. 2002) while recording the same differential, points out that the reduction in the last two years has been very slow. Examining education, several countries have remained unchanged (Sweden and Italy), some have closed the gap (Germany, Austria, and Ireland), but most have taken a retrograde step (Portugal, Belgium, Greece, Spain, Luxembourg, the UK). Compared to the US, whilst having a similar profile (except for unemployment), there is still someway to go, on average by approximately 15%.

Enterprise access: Nordic countries set the benchmark for enterprise access, with middle performers setting the standard for self employed access; however Europe's SMEs have some way to go

SIBIS's revealed that enterprises within the EU's Nordic countries lead the US in terms of employee and self employed status for access to the Internet. Apart from the Nordic countries, the

UK, the NL, Germany, and Belgium excel in self employed Internet access – all above the US – an encouraging trend. This undoubtedly is related to the numerous high profile European initiatives – such as the Go Digital programme. The trend however supports a north/south European divide, with Greece being interesting in that it has near convergence across all work activities.

Enterprise access to the Internet shows good uptake with the EU 7 average approaching 90%. Whilst this figure is the same as the eEurope2002 benchmark, SIBIS also includes micro enterprises, and therefore paints a more optimistic picture of uptake. Work access is also an important issue within the EU, as 1-in-7 regular Internet users only access the Internet at work. This is an important issue for policy and raises questions about how much and what types of "private" usage are taking place in the workplace and what should be the policy position in relation to this. On the whole this shows employees are not being excluded form the benefits of ICT investment. Whilst overall the general trend is encouraging, SIBIS revealed (through the e-Biz W@tch survey commissioned by DG Enterprise) [3] significant differences between large and small firms when it came to employees access to email, Internet and extranet uptake, which varied between 26%, 14.5%, and 49% respectively between large and small enterprises – a significant differential. This is a crucial area outlined in eEurope 2005, but is a particularly difficult issue to address directly.

[3] Information and results of the e-Biz Market Watch survey are available at www.ebusiness-watch.org

1.2. Modern online public services

e-Government: Activities are increasing, benefiting from convenience, location and ease of use, but education and awareness raising are still required to highlight e-government services and benefits

Interactive e-Government services are a significant area of eEurope actions. e-Government development is ideally based on the availability of public services, as well as on a thorough understanding of how users perceive e-government, how well they can complete expected transactions, and what barriers stand in the way of successful adoption.

According to eEurope 2002 Final Report, it was found that, in October 2002, all Member States at least partly offered the range of 20 basic services defined by the Council. Although much progress has been achieved, still many services have limited interactivity; (one of) the aim of eEurope 2005 Action Plan is that all Member States have interactive public services by the end of 2004. The indicators proposed by eEurope 2005 Action Plan, therefore, concentrate on the supply side of e-government, availability and level of sophistication; SIBIS indicators complement those by addressing the demand side of e-government: usage, awareness and attitude. By measuring acceptance and adoption, SIBIS indicators closely match the eEurope initiative to assess the feasibility of including impact indicators in the benchmarking exercise.

From SIBIS results, it appears that respondents from northern countries show a greater preference for interacting with government via Internet, also in comparison with the US. E-government initiatives in the UK, Ireland and France are not as preferred when compared to traditional access. The main benefits perceived are convenience of location, ease of use and saving of time. In addition, citizens felt that e-government is faster than traditional government. Interestingly, results show that, in all countries, preference for Internet decreases as the interaction results in the disclosure of personal information. The main exception to this, is the Tax declaration online service. Here, the concerns about the disclosure of personal data are overcome by the consideration of the advantages brought by the online submission. This is an area requiring policy intervention as it appears that barriers are not insurmountable.

Other issues in the eEurope Action Plan include online public procurement, and that a substantial proportion of goods and services should be sourced via e-commerce. SIBIS confirms (see section 4.1.2.) that a substantial component (over a third) of products and services sold online by financial and business services, distribution, and to a much lesser extent engineering, are sold to the public sector. Whilst this is still limited in volume terms, the profile is still encouraging.

1.3. e-learning

e-learning in the educational system: some member states are making good progress in digital literacy, but on the whole the EU has some way to go

A central element of the e-learning action plan is to develop systems to train pupils and students as well as adults to become digitally literate. The use of e-learning among European students is at similar levels to the US: 45% in the EU have used e-learning within the 4 weeks previous to the survey, with 33% having used on-line e-learning materials.
These data indirectly confirm the modernisation of the education system and the increased access to information and communication resources recorded by eEurope 2002 Final Report.

SIBIS reviewed the Digital Literacy of Europe's general population, an important variable in eEurope 2005 goals, indicating the readiness of the population to use the internet for work and be active participant in the Information Society. In this regard the US was well ahead of the EU, with almost double the level of digital literacy. A few northern member states are near the level of USA, with a north-south division in the level of Digital Literacy being a reality. Here, Belgium, Italy, Spain, France, Greece and Portugal display the lowest level of Digital Literacy among the total population.

The picture is more positive if only the youth (age up to 25 years) are examined. Here, the differences between the EU's countries diminish from a factor 3 between the highest and the lowest scoring EU country to a factor of 2. Still France, Greece, Portugal and Belgium are below the EU-average. Also, a significant gender gap exists within Digital Literacy (biased against females), and in the EU generally could give cause for concern, especially for those below the EU average (Belgium, Italy, France, Germany, Luxembourg, Portugal, & Greece).

e-learning and participation in work-related training courses: participation is higher than expected

Life-long learning initiatives are a crucial part of improving the flexibility and skill of Europe's workforce, but also in improving the skills required for the IS. Activities need to be stepped up for the unemployed.
e-learning can play a decisive role in delivering learning systems which meet the demands of today's workers, and the unemployed; and is a key action area proposed by eEurope 2005. SIBIS found that the share of the labour force that uses e-learning is on average 15% in the EU, and 23% in the US. Within this there are rather large deviations across the countries (with Greece, and France at the tail end) with just a third of e-learning intensity among the labour force compared to the leading European countries (like Finland, Germany, the Netherlands and Austria, but also Denmark, the UK, Sweden and Luxembourg).

Examining work-related training courses also helped to shed some light on the general training of workers in the EU & US. Overall, a little under one in four of the EU labour force reported participating in work-related training, and almost twice this number reported engaging in self-directed work-related training. These rates are higher than estimated so far. The results showed a threefold higher share of individuals participating in work-related training in Finland and 2.5 times higher share in countries like Denmark and the Netherlands compared to Greece and Portugal. The US again ranges at the top together with Finland. SIBIS also suggests that the skills gap between the current workforce and the unemployed is going to widen because of the extent to which persons in employment are engaged in company-provided training, and also self-directed learning. It seems that the training provided by the state to the unemployed cannot make up for the provision of learning opportunities companies supply to their employees.

1.4. e-Health

The US leads in online searching for health related information by Internet users and by the population overall, and cultural and institutional factors within the EU are likely to influence convergence of e-health activities

Amongst those aged over 15 years who used the Internet in the previous year, a little over one third of respondents in the EU (36.4%) reported using the Internet to search for health-related information, translating into about one in five (19.8%) of the European population when non-Internet users are taken into account. Online searching for health information is thus of growing importance within the repertoire of health-related activities of Europe's public and consequently for public health policy in Europe. Nevertheless, online searching for health information is more prevalent in the US than in the EU, being reported by more than half (58.3%) of US Internet users a figure that translates into more that two in five (44.9%) of the US population. Searching for general information was the most common reason cited, closely followed by searching for a second opinion on a medical diagnosis (being done by just under one in ten of the EU population (9.9%) and just over one in four in the US (26.2%). The SIBIS results also indicate that users were a lot more likely to rate pharmaceutical companies and private health insurers as untrustworthy sources of information in comparison to universities or other non-profit organisations.

Internet access location and age are significant variables in seeking health related information

In both Europe and the US the usage of the Internet to search for health-related information appears to be sensitive to location of usage, at least to a certain extent; Internet users who have access to the Internet at home are more likely to search for health-related information than those who do not (40.6% versus 25.4% in the EU and 62.8% versus 41.3% in the US).

The Internet and the access that it provides to health-related information may be exacerbating existing socio-demographic "divides" in relation to health matters: at the population level, those in the retired/other category had the lowest prevalence of online health-information searching (7.4%), those who were unemployed/temporarily out of work (18.4%) and the self-employed (19.8%) were in an intermediate position, and the highest prevalence was amongst those in education (30.8%) and those in paid employment (26.4%). In summary this translates to about one in ten in the EU (10.7%) and one in three in the US (32.2%) searches the Internet to be better informed about their health.

1.5. A dynamic e-business environment

Online sales: low volume of online sales continue, although some sectors/member states are championing the cause

On the whole the results confirm the general perception that the volume of sales generated by e-commerce (BtoB) is small: for half of the establishments involved in it online sales represented less than 5% of their total sales revenues. The performance of sales to consumers (BtoC) shows less a differential between leaders and laggards, however, on average the uptake is slightly less (9.9% compared to 12%). Segmenting online sales into four macro sectors shows that, unsurprisingly, sales (of BtoB, BtoC, and BtoG) for distribution takes the lead, followed by financial and business services following closely behind, with manufacturing undertaking significant BtoB sales. Public services follow someway behind the pack, but conversely, it is interesting that other sectors sell

almost a third of their products online to the public sector. Although eCommerce is still marginal for most enterprises, it is generally viewed as having positive impacts on customer service and efficiency of business process.

20% of the EU's population are e-com buyers, however, the Internet is still not mass market. Socio-economic factors still effect online purchasing decisions. Reasons for this are because buyers are more often sophisticated users with longer online tenure. Also, age, education and income gaps are affected by the "access gap". The closing of this gap was most noticeable with purchases undertaken by the female population. Ascertaining consumer purchasing behaviour revealed that in Europe approximately a third (36%) of Internet users order products or services online, translating to 20% of the overall population. Here the US leads, but with Denmark, the UK, and Sweden closing the gap. Also, two of the big four European economies (I & F) have some catch up, not only on the EU average but those in the leading field.

E-commerce shows marginal growth over the 6 months since the Eurobarometer survey (November 2001), unfortunately though SIBIS observed that key socio-demographic characteristics differentiate the e-commerce buyer from the average Internet user. Examining the socio-demographic profile of e-commerce buyers revealed a gender and education bias. The gender balance shows that in Europe buyers are more likely to be male than female (SIBIS predicts this gap to close). In terms of education, a comparison between user groups confirms that a higher level of education is correlated with a propensity to be an interactive user or a buyer. This is possibly linked with a greater ability to use online transactions, and/or the self-confidence to deal with security and privacy-related fears.

SIBIS also found that one-in-three Europeans report that security concerns often stop them from buying goods or services online. This is higher than the one in four in the US, although users in some EU countries are as undaunted by security concerns as their counterparts in the US. However, being stopped by security concerns is not the only factor involved. Some countries (such as Belgium) have low levels of e-Commerce despite also having low levels of citizens being put off by security concerns.

84% of Europe's enterprises purchase online: MRO (maintenance, repair and operation goods and services, such as office supplies) online purchases are diffused across enterprise size and sectors.
A significant proportion, over 60% in fact, of online enterprises in Germany, Finland, and the UK purchase over the Internet. The propensity to buy online is diffused across size classes, including SMEs, and generally demonstrates a much higher propensity to acquire than sell online. Enterprises are more likely to experiment with online purchases, especially for MRO) which are not strategic to their core business.

1.5.1. e-Business Readiness

Interoperability: more complex interactions are increasing, with certain sectors leading the way.

The ability to negotiate, plan and manage the production and delivery of goods through an integrated ICT system has the potential for the enterprise to be connected in a virtual chain of supply, production and delivery. Potentially reducing transaction costs and increasing the speed of delivery enables significant commercial advantage for Europe's enterprises and is a goal of eEurope 2005 – via interoperability. Online management of capacity and inventories and the negotiation of contracts have between 7% and 27% uptake across economic activities. These appear to be very limited applications though, illustrating that enterprises generally have a long way to go before more complex interaction/negotiation can be undertaken electronically. It appears that security fears, the value added of such activities, and the compatibility of differing systems still poses significant barriers. This is a significant action area for eEurope 2005, and therefore results would suggest further research in the application of standards across the economic landscape.

The use of e-CRM (electronic Customer Relationship Management) and e-SCM (electronic Supply Chain Management) are often seen as the cornerstone of an e-business strategy. In comparison to the uptake of other applications, e-CRM and e-SCM are particularly less developed. Interestingly though, a few sectors are championing the cause, biased towards the service/finance sector.

1.6. A secure information infrastructure

e-security is still considered a significant issue, but there are varying degrees of protection and policies across the EU's enterprises

SIBIS discovered that there is almost uniform concern for data security and privacy across the EU (73% and 78%, respectfully) not demarked by a north/south divide or in terms of developed infrastructures – highlighting a general increased awareness and culture of security issues.

In terms of security within enterprises, there were an increasing number of security breaches, which are prominent in Italy, Finland, and France. This generally correlates in an increased incidence of a security policy in those respective countries' enterprises There was a correlation too between the likelihood of a security breach and company size; accordingly, within larger enterprises there was a 40% greater chance of an information security policy, when compared to small enterprises.

On the whole, computer virus infections were the major type of security breach, following significantly behind were unauthorised entry to internal networks, identity and online fraud. In retaliation across the EU, a variety of measures are used to preserve the computer systems security. The most consistent approach appears to be only to allow controlled access to the computer system. Surprisingly given the most prominent type of attack, firewalls and security training have less of an uptake.

SIBIS's compound indicator, which included a number (five) of security indices, highlighted that whilst the US is the clear leader in terms of protection, several member states are not far behind.

1.7. Broadband

Increasing price reductions, easier installation, and growing online tenure are contributing to enlarged broadband penetration, but Europe is still playing catch up

Approximately 7% of at-home users' connections are broadband (May, 2002). While the average is behind the US (16% in May 2002 and current figures put it at over 20%) there are individual countries within Europe that have equally high levels of broadband penetration.

Growth in broadband is quite strong in some countries, with the US showing a twofold increase in broadband penetration compared to the EU15 average. The UK is another example of a country which has increased its broadband penetration at a much faster rate that some of its European counterparts. This may be because of the introduction of cheap-rate ADSL over the last year, and a higher penetration of other broadband technologies such as cable operators, which currently have a large base of subscribers in the UK, making it one of the most competitive markets in Europe in terms of existing broadband infrastructures. Competiviness in the broadband market in Europe is still generally low. Most users upgrading to broadband are subscribing to incumbents deals. Even though it is two years since Member States were required by EU law to open their local exchanges to enable competing operators to provide DSL latest figures from February 2003 from the European Competitive Telecommunications Association (ECTA) revels that still less than 5% of the nearly 200 million telephone lines in the EU are equipped for DSL. Moreover, over 80%current DSL exchanges are incumbents ones
Also, younger user groups are driving the growth of broadband access in the EU15. Examining Internet connections at home according to age groups, SIBIS finds that people between the ages of 24 and 49 show higher adoptions rates of high speed connections at home.

Understanding the migration path from dial-up connection to broadband access is important if measures to encourage its adoption are to be better formulated. The US experience indicates that long experienced narrowband users, those with high online tenure, migrate to broadband because of the better quality of access and the faster and persistent connections associated with it. The figures suggest that migration to a faster connection than dial-up is highest in the US, Sweden, Spain, Portugal, Finland, the Netherlands and Denmark. As well as tenure, migration is strongly coupled to countries that have cheaper higher-speed connections. This is particularly true in countries where ISPs flat-rate connections are not being offered to narrowband users, but only to broadband subscribers. In these countries unmetered broadband becomes much more attractive for heavy Internet users. SIBIS has shown how in countries with higher broadband penetration rates at home, users tend to have longer online sessions than narrowband users. This indicates not only that broadband encourages users to use the Internet more, but also that the broadband technologies allows them to get a greater and more effective online experience than narrowband users can ever experience in the same time spent online.

In addition to decreasing the price gap between narrowband and broadband subscription rates, an important factor to boost migration has been the introduction in Europe by Broadband Service Providers (BSPs) of self-installing software packages. One of the major barriers in upgrading to broadband was the high associated costs with the installation. This can now be done easily at-home, substantially reducing the initial costs for shifting to broadband. This recent factor has been one of the major drivers to broadband adoption in 2002, not only in Nordic countries, but also in Mediterranean countries.

2. Internet Indicators

2.1. Citizens' access to and use of the Internet

2.1.1. EU policy goals and definitions

In the area of telecommunications and access, the eEurope 2005 goals set in Seville in April 2002 represent a shift from a quantitative set of goals, to a more qualitative one. The focus of the earlier eEurope 2002 Action Plan was on extending Internet connectivity across Europe. eEurope 2005 focuses on translating this into improved economic productivity and better, more accessible and sustainable services for all European citizens, underpinned by secure, widely available broadband infrastructure.

In monitoring the uptake of the Internet in Europe, the Commission proposes to collect data on various telecommunications and access issues, including: the percentage of households with access to the Internet, and the percentage of those who regularly use it, the proportion of people who use the Internet in their normal work routine, and the cost of Internet access. Supplementary indicators will include data on what types of device people use to access the Internet and the different locations from which they access the Internet. Hence within the eEurope 2005 framework two policy indicators and three supplementary indicators have been proposed to assess the citizen's access and use of the Internet.

Under the scope of the SIBIS project, several indicators have already been developed which track access and use of the Internet across the EU Member States, Switzerland and the US. The table above presents the indicators that bring equivalent, similar, or complementary results to the ones proposed above for the eEurope 2005 work.

Results obtained in SIBIS indicators will be presented and compared to the indicators under the scope of the eEurope 2005 framework. The focus will be on the methodological lessons learnt and on existing differences seen in the definitions to the benchmarking indicators proposed by the Commission. Finally, some additional indicators, relevant for the topic of telecommunications and access (T&A), and developed under the scope of SIBIS will be presented.

Table 2.1 The EC's eEurope 2005 benchmarking indicators and SIBIS's equivalent/supplementary indicators

e-Europe 2005 benchmarking indicators	SIBIS indicators
Policy indicators: A.1 Percentage of households/individuals having access to the Internet at home A.2 Percentage of individuals regularly using the Internet **Definition:** Population ≥16-74 Regularly defined as at least weekly. Use to include all locations and methods of access. **Source:** Eurostat/NSI ICT household survey, data to be collected on a comparable basis **Frequency:** Annual, first deliverables 2003, second October 2004, third October 2005, with as reference period 3rd quarter 2003/4/5 **Supplementary indicators:** A.3. No. of individuals with access to the Internet broken down by device for accessing via digital TV, mobile device (include all forms of mobile access; handheld computer, mobile phone, identifying 3G (UMTS). A4. No. of individuals with access to the Internet broken down by place of access (home, workplace, school, university, Internet cafe, PIAP etc). A.5. Percentage of households connected in Objective 1 regions.	**Internet access indicators:** 1. Percentage of households with online connections at home 2. Percentage of users using the Internet according to frequency of use **Definition:** Population ≥16. Access defined as in last 4 weeks/year. Use to include all locations and methods of access. **Source:** SIBIS GPS **Collection Date:** GPS: May 2002 for EU 15, US, & CH **Internet access, usage, and impacts indicators**: 1. Percentage of at home users accessing the Internet by alternative devices other than a PC/Mac (via digital TV, mobile access, PDA/Palmtop, mobile phone, game consoles, other) 2. Share of respondents accessing the Internet from different locations. Multi-context users: weekly average time spent using the Internet from one, two, or multiple places -- (a) at home (b) at the workplace (c) at an educational institution (d) at free PIAP (e) at commercial PIAP 3. Internet drop-outs - Share of persons who used to have Internet access at home, and do not have it anymore 4. Users according to online tenure (share of users according to length of time since first use of the Internet) 5. Internet access and social inclusion: other SIBIS indicators 6. Socio-economic factors and associated digital divides. Elaborated for at risk groups & education.

Source: eEurope 2005 & SIBIS.

2.1.2. Results from SIBIS

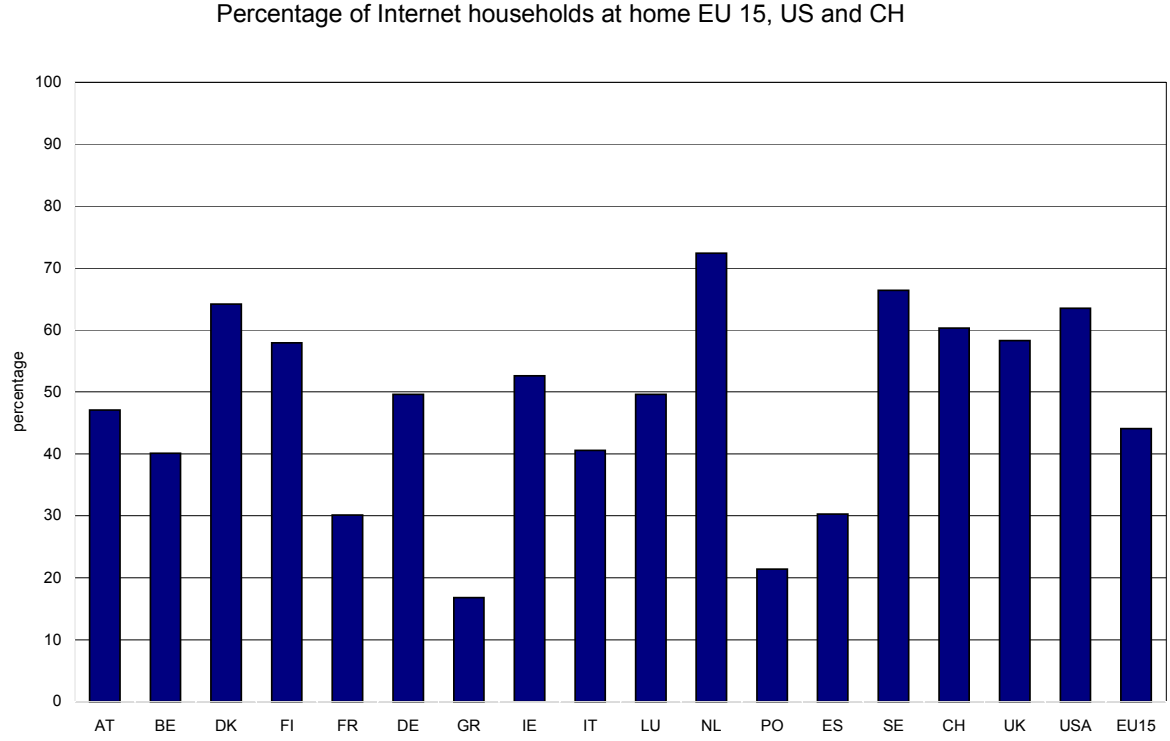
2.1.2.1. Percentage of households/individuals having access to the Internet at home

SIBIS collected exactly the same indicator as A.1., however, it should be noted that 'access' is a loose term, and when phrasing the question it needs to be clearly specified that the respondent has an 'Internet connection' at home, which can be 'accessed' without restrictions for his/her personal use. In the SIBIS work for this indicator, only the percentage of households with access was taking into consideration, in order to avoid duplications (e.g. different individuals accessing the Internet from the same household connection). The SIBIS indicator was formulated as follows:

A1 SIBIS T&A indicator: Percentage of Households with Internet access at home.

Results including country comparisons are presented below:

Figure 2.1 Percentage of households having an Internet connection at home by country (EU15, Switzerland, and US)
Question: Do you have access to the Internet in your home?



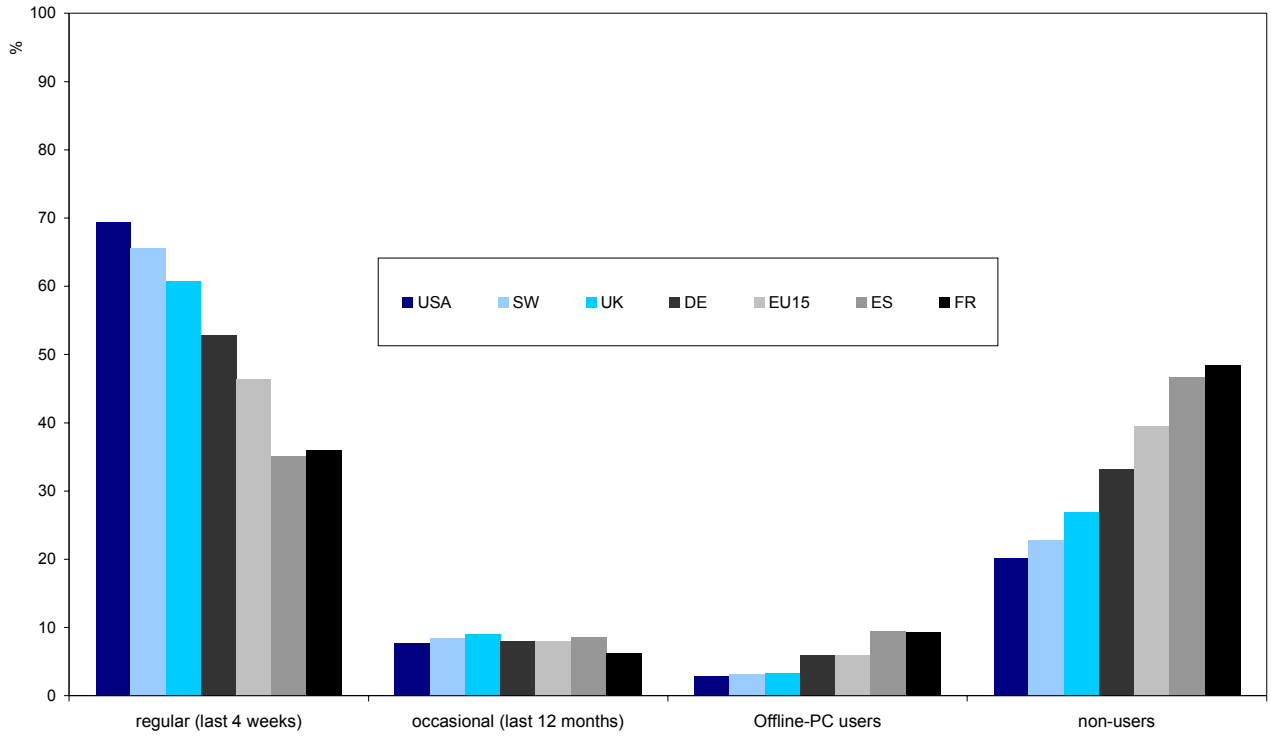
Base: all respondents (N=11832), weighted; EU15 (N=10306) weighted by EU15 population
Source: SIBIS 2002, GPS

The figure above portrays the percentage of online households in EU15, Switzerland and the US. The nature of this indicator is to move beyond counting instances to measuring time factors. The data collected from this indicator has shown that Internet access is still lower in Europe than in the US, although there are some leading countries in the EU15, which surpass the US penetration rates, such as the Netherlands or Sweden. On the contrary, Greece requires some catch up.

2.1.2.2. Percentage of individuals regularly using the Internet

A similar, comparable indicator has been developed under the scope of SIBIS work looking at the share of users according to the frequency of Internet use. This SIBIS indicator has distinguished between 'regular', 'occasional', ' offline PC users' and 'non-users'. Data has been collected in these categories for all EU15 countries, Switzerland and the US. An illustrative graph including a selection of countries, which portrays interesting differences in usage-patterns, is included below:

Figure 2.2 SIBIS respondents according to frequency of Internet use
Questions: Have you used the Internet at least once in the last four weeks at home, at school, or work or in any other place?
Have you used the Internet in the last twelve months at least once?



Base: all respondents weighted n=10, 306
Source: SIBIS 2002, GPS

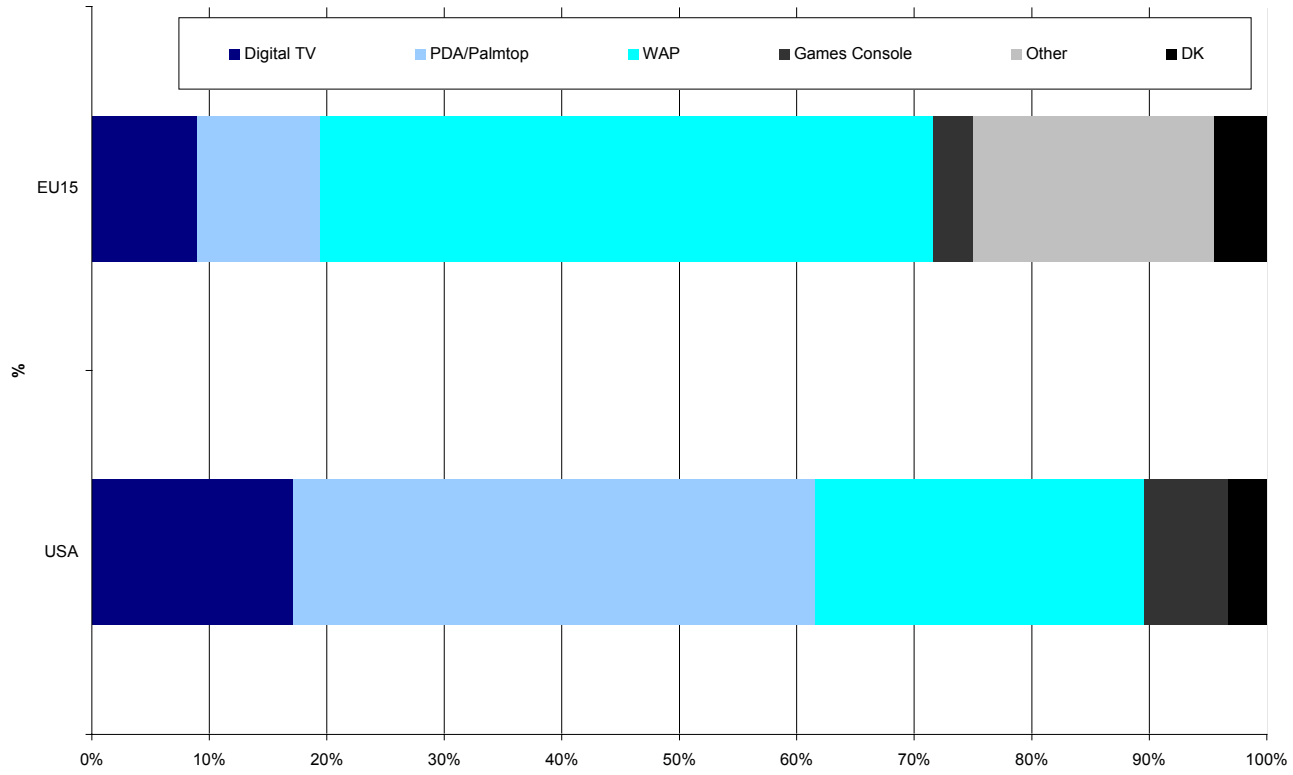
When looking at the share of respondents according to frequency of Internet access, the data shows that different patterns of Internet usage emerge in different EU countries. A common pattern is that Internet users access the Internet in most EU15 countries regularly - at least once in the last four weeks. Therefore, according to the data 'Regular access' of the Internet is particularly high in the US, Scandinavian countries and the UK. Generally, it is much more rare that Internet users access it only occasionally (e.g. once in the last twelve months). Nevertheless, there are still nearly 40% of EU15 citizens who do not access the Internet at all. This is particularly true in Mediterranean countries, where over 45% citizens do not access the Internet from any location. Moreover, in Mediterranean countries there seem to be also a higher rate of PC offline users who do not use the Internet (about 10%). This is extremely rare in Nordic countries and the US.

Supplementary statistical indicators

2.1.2.3. No. of households with access to the Internet broken down by device for accessing via an alternate device

A SIBIS indicator examines the share of users who access the Internet from multiple devices other than a PC/Mac. However a first difference which can be noted with respect to eEurope 2005 indicators is that SIBIS looks at 'the share of users' instead of 'total number of users' as in the supplementary indicator proposed by the EC (A3). In general, under the scope of SIBIS work, descriptive statistics were preferred in order to portray country comparisons. Mobile phones were included among the alternative devices to access the Internet, although the distinctions between 3G/UMTS were not tracked. Alternative devices included Digital TVs, PDAs or palmtops, Mobile phones (both with WAP or 2.5G capability), Game consoles, and 'other device not mentioned' as categories for the SIBIS responses.

Figure 2.3 Share of at-home respondents who have accessed the Internet in the last four weeks, with other devices than a PC/Mac
Question: In the last four weeks have you accessed the Internet in any other way than via a PC or Mac, IF YES, Which devices did you use?



Base: Internet-users who access the Internet also by other devices than PC or Mac, EU15 results weighted by EU15 population (N=340). USA results weighted (N=55). Multiple responses permitted
Source: SIBIS 2002, GPS

In the US, at-home users are consistently accessing the Internet through more platforms than in the EU. This is particularly true for PDA/Palmtop and digital television access. Digital television

access is twice as high in the US than in the EU. Likewise access through PDA/Palmtop devices was four times higher. The results change for mobile phones where the EU shows higher rates of WAP Internet access than the US. The 'other' figure appears to be quite high. There could be any number of reasons for this, including semantic confusion, for example, counting a laptop as an alternative device.

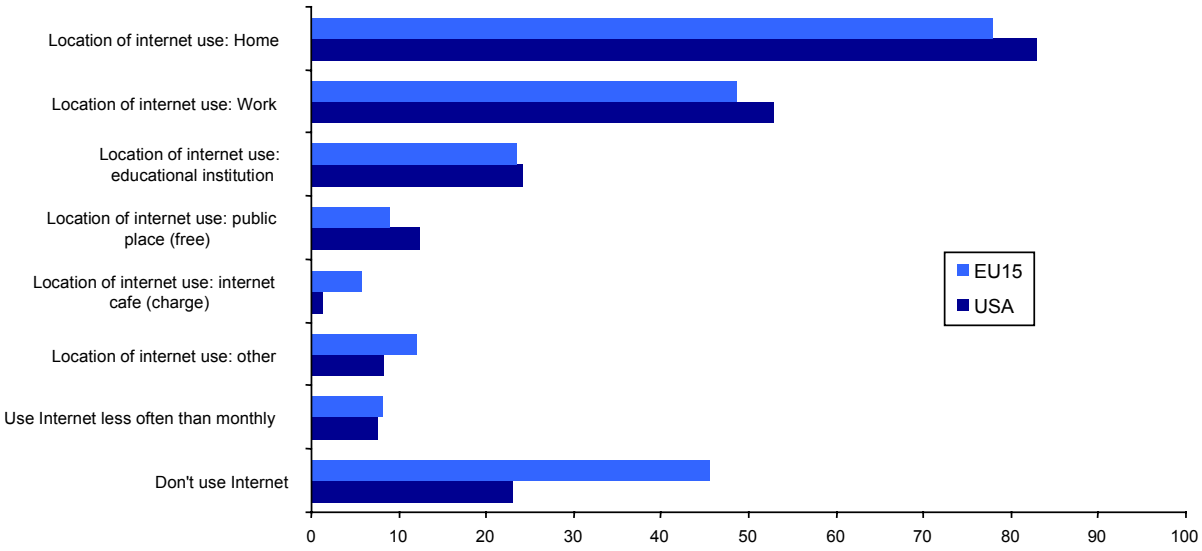
As a result, one of the lessons learnt for future work is that one has to be very clear when formulating the question. A large number of 'other' always needs to be investigated. In addition, the data has also shown that due to the large number of 'DKs' and 'other' EU responses, it seems that currently users in the US are much more familiar with existing technologies to access the Internet. On the other hand, European citizens are more confused with identifying alternative Internet devices other than mobile phones.

2.1.2.4. Number of individuals with access to the Internet broken down by place of access (home, workplace, school, university, Internet cafe, PIAP etc).

The SIBIS equivalent indicator counts the percentage of Internet users (in the last four weeks) who have accessed the Internet from multiple locations. This differs slightly from the indicator proposed by the EC which looks at the 'total number of individuals'. Other differences in the approach related to the categories put forward to choose from. Firstly, in SIBIS, educational institutions were not split into schools and universities but counted together. With Public Internet Access Points SIBIS separated free PIAPs from commercial PIAPs. SIBIS also includes an 'other category' for alternative access points (e.g. a friend's house).

The chart below illustrates differences between the EU 15 average and the US.

Figure 2.4 Users in the last four weeks accessing the Internet from multiple locations



Locations of Internet usage (at least once in the last four weeks).
Base for locations of usage (mutli response; usage at least once a month): USA n=664 weighted, EU15 n=4889 weighted by EU15 population

Base for Internet usage ('regular' = at least once in the last four weeks USA n= 1004, CH n= 522, EU 15 n = 10306)

Source: SIBIS 2002, GPS. Survey questions A7, A8 and A9. Non users were filtered out, utilising the question A7 ('*Have you used the Internet at least once in the last four weeks at home, school or work or at any other place?*'). Share of users per location is obtained from the question A9: *'How much time do you spend in a typical week on using the Internet…[item] a) at home, b) at the workplace, c) at school, d) at a public place where Internet access is free, e) at an Internet café or other place where you have to pay for access, f) at another place not mentioned yet?'.*

Different Internet access locations can lead to different on-line activities with advantages and disadvantages when compared to at-home access. Being able to access information at-home at any time, a person may be less likely to access, for example, personal health or financial information from a library or other public facility. On the contrary, where higher bandwidths are required, a person may use a PIAP facility. In the United States, the share of Internet users at work and at home is higher than the EU15 average. Moreover, studies have shown that in the US, Internet access from multiple locations is rising. According to data published in the OECD 2002 Information Society Outlook, the share of people who use the Internet from both their home and some other location is growing particularly rapidly in the US, and use at work also increases the propensity to use the Internet at home. On the contrary in the EU, there seems to be still a high proportion of the population (almost twice as much as in the US) who do not access the Internet from any location.

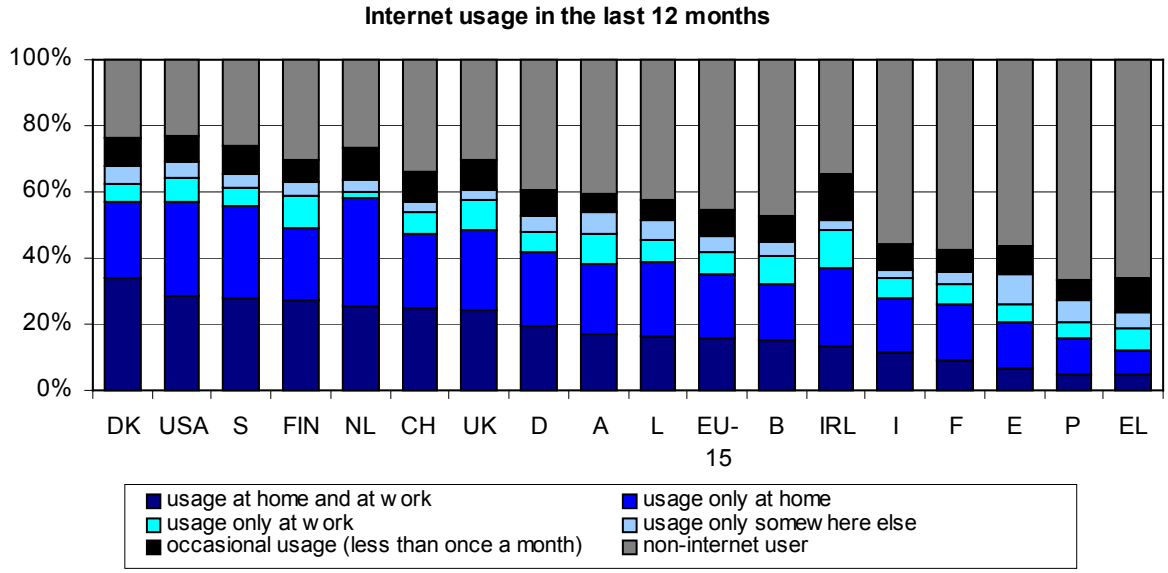
PIAPs are a key feature of eEurope 2005, where all citizens should have easy access to them, preferably with broadband connections, in their communes/municipalities. From SIBIS work it appears that PIAPs are an important vehicle for promoting the Internet and its useFurther breakdown by social-demographic and employment status may provide a better insight into the use of PIAPs and its role is increasing access to the Information Society to all citizens. It would be especially interesting to look at regional data and the level of use and provision of PIAPs in rural

areas. There are still many rural areas of Europe not covered by broadband and it may be that the provision of PIAPs in these areas has a bigger impact.
As an extension of SIBIS, it will be interesting in the future to track access through wireless points and another Internet Access location.
With regards to other Internet locations, it will be interesting to track in future access through Wireless points. Commercial Wi-Fi hot spots are springing up across European countries as operators rush to build high-speed wireless networks at locations such as railway stations, airports, business parks and coffee shops. There are already several thousand hot spots across the US and numbers are now growing rapidly in Europe.

On a methodological note, given that people younger than 16 years old, according to European law, cannot be included in telephone surveys, they are misrepresented when asking about time spent using the Internet at schools. This may explain why the response rate for Internet users in educational locations was quite low. This fact needs to be considered and weighted.

The figures below portray estimated weekly average time-spent online for both at-home and at-work users. Similar charts could be produced including time spent at educational institutions, time spent at free PIAPs, time spent at paid PIAPs, and time spent at other Internet locations (e.g. friend's house), all variables which have been counted in the SIBIS survey.

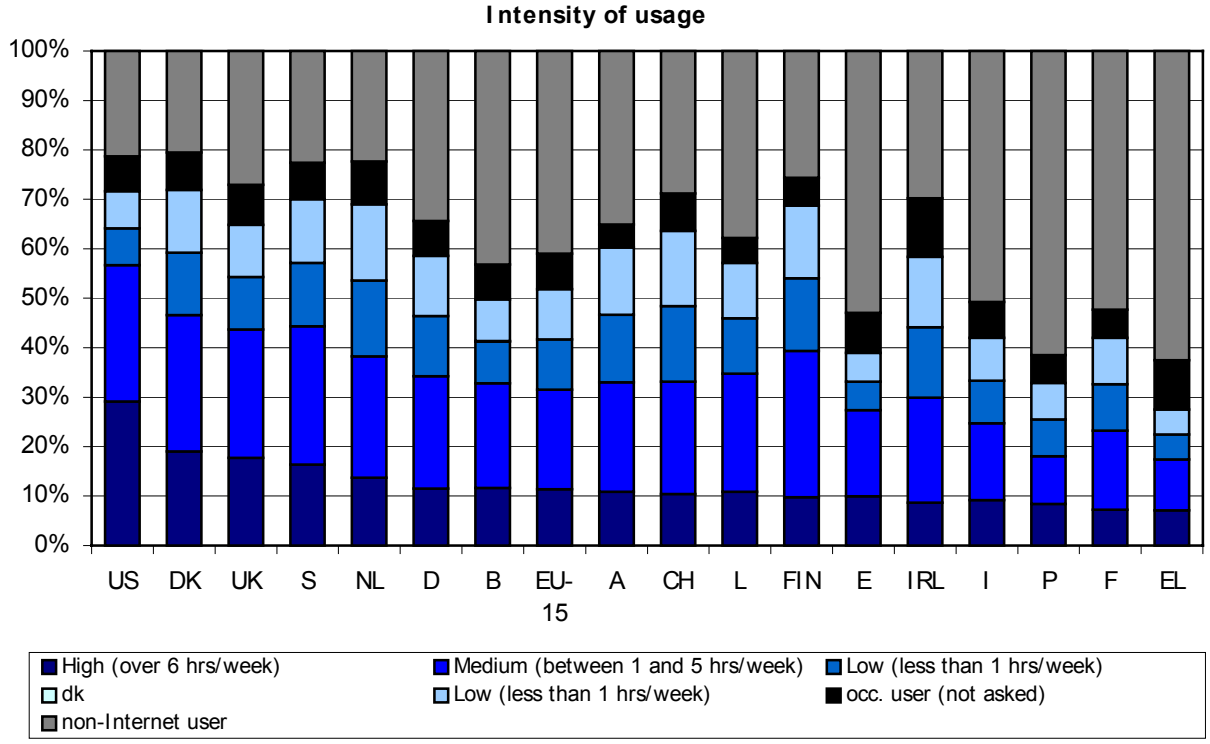
Figure 2.5 Online average time spent according to countries (EU15, Switzerland and the US)



GPS question: A9
How much time do you spend in a typical week on using the Internet ... [item]
(a) at home?; (b) at the workplace?; (c) at school, university or another educational institution?; (d) at a public place where Internet access is free?; (e) at an Internet café or other place where you have to pay for access?; (f) at another place not mentioned yet
Base: respondents with Internet access at home who have used the Internet at least once in the last 4 weeks (N=4631). EU15 results weighted by EU15 population (N=3838).
Source: SIBIS 2002, GPS

For the development and implementation of the Information Society in Europe it is important to track from which location/s users are accessing the Internet. SIBIS data has confirmed that most users access the Internet predominantly from home. However there is a clear pattern of users accessing the Internet from different locations. In the US as in Scandinavian countries, the UK and the Netherlands there is a large proportion of bimodal users who accessing the Internet in both at home at work locations. Generally, countries with a high penetration of at-home and at-work Internet users in the last four weeks are those countries with a more experienced Internet population, both at work and at home. These countries register lower penetration rates of Internet access from: 'other locations' than at-home/at-work; whether a paid or free PIAPs; access from a friend's house; a mobile phone; a school or any other location, and of occasional usage. In less mature Internet countries only at-home usage is more common, and since many users do not have at-home connections, there is also a higher proportion of people accessing the Internet from ' other locations'. Likewise occasional Internet usage is more common.

Figure 2.6 Intensity of online usage (EU15, Switzerland and the US)



Source: SIBIS 2002, GPS (Base: total sample size 11832; the population of Internet users -weighted EU 15 = 4781, population of Internet users in Switzerland = 287 and In USA = 593). Survey question A9, item d [Internet users 'at a public place where Internet access is free' and item e [at a public place with paid access].

The pattern of weekly average time spent online at home seems to bring different levels of online intensity of use, which have been classified as low, medium, and high according to the weekly average time online users spent from any location. Across all the European countries surveyed, users in more mature online countries spend longer sessions using the Internet as in the US, UK, and SE, with over 50% of users spending longer than one hour per week online (much higher than in Mediterranean countries).

An additional indicator which was not developed under the scope of SIBIS, but which is nevertheless important when doing time-spent patterns comparisons across EU countries, which are the current divergences of availability of Internet connection rates, whether flat-rates un-metered packages, or metered pay per time connection rates. It is important to highlight that narrowband flat-rate connections are not available across all European countries. Flat rates Internet Access Call Origination (FRIACO) products are currently only offered in six European countries – the UK, the Netherlands, France, Spain, Portugal, and Italy. This should be taken into account when comparing time spent at-home across different countries. The very reason many incumbents are not offering flat-rate is that they are worried they will have to offer FRIACO as a result. This decision is harming both competitors and ultimately the ordinary end-users and the general development of the market too. Research undertaken by Oftel in the UK shows that Flat-rate users spend much longer online, and flat-rate provides a useful bridge between per-minute dial-up and broadband access, thus helping the development of the market. Since Oftel introduced un-metered Internet access in 2000, five million UK households have taken up one of the many un-metered products on offer from different providers, and the UK leads Europe on un-metered

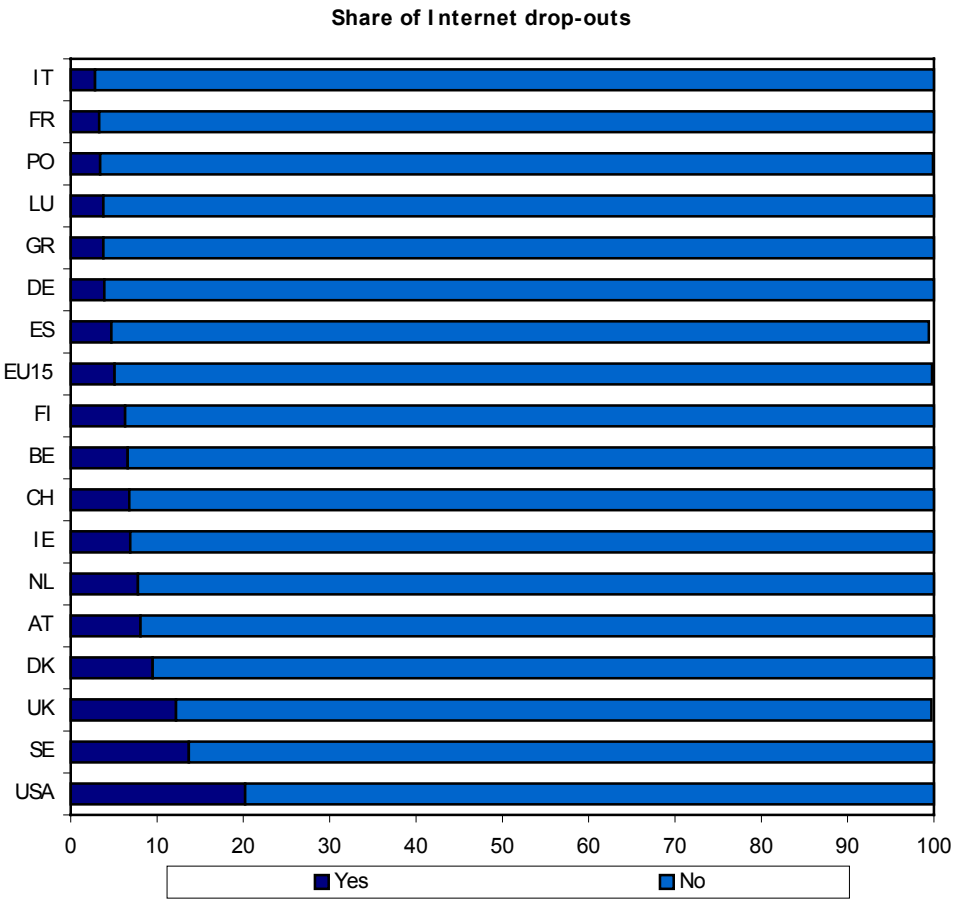
access. Oftel's regulatory and monitoring work has helped the UK to become one of the most competitive Internet market's in Europe in the last two years.

New EU regulatory framework for electronic communications contains a provision for national regulators to require incumbents to meet reasonable requests for access to network elements where denial of access would hinder the emergence of a sustainable competitive market at the retail level. This provision could easily be used by regulators keen to see the introduction of FRIACO in countries where incumbents are not currently offering retail flat-rate packages.

Extending Access: other SIBIS related indicators

2.1.2.5. Share of Internet dropouts

Figure 2.7 Share of respondents who previously had an Internet connection at home
Did you once have Internet access in your home?



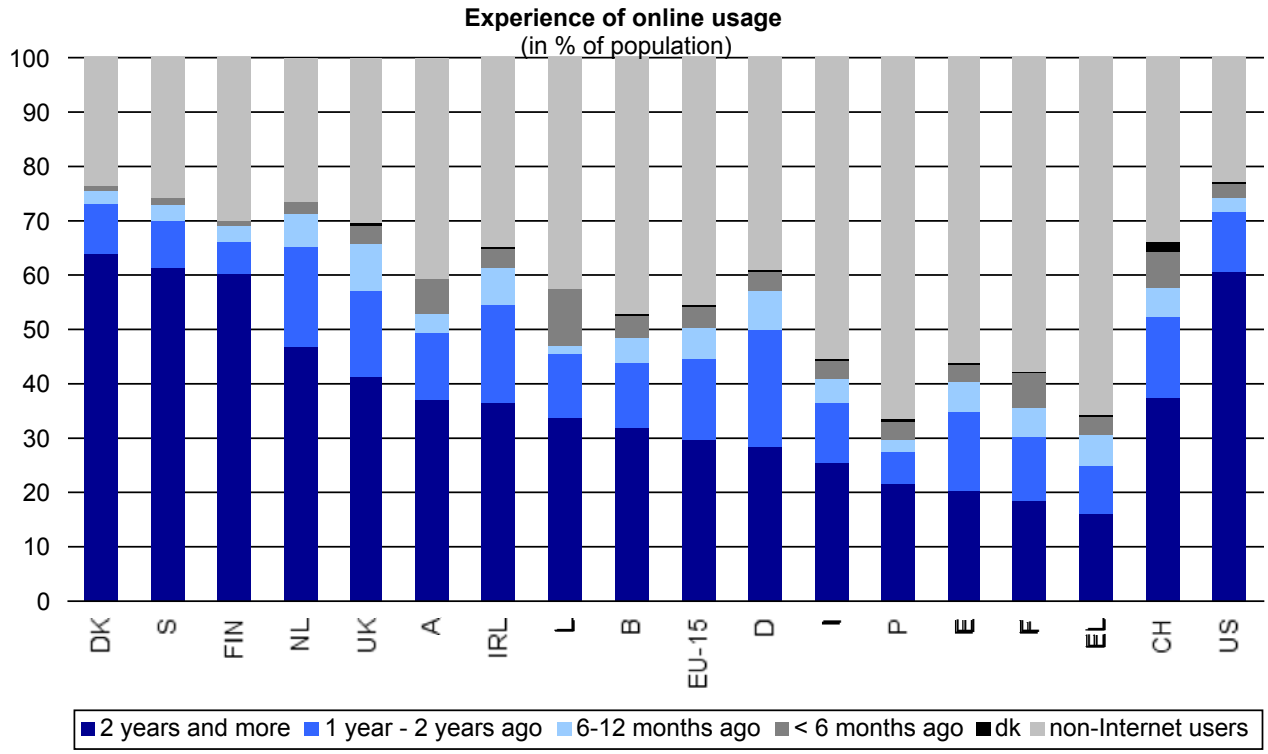
Base: Share of respondents with formerly Internet access at home (N=6266), weighted. EU15 results weighted by EU15 population (N=5635).
Source: SIBIS 2002, GPS. Column percentage.

This indicator looks at the percentage of people in the EU Member States, Switzerland and the US who used to have Internet access at home and have now stopped their connections. There could be a number of reasons for this, for example, cost, 'Internet fatigue', faster access at work. It could also be the case that the respondent falls in a transition phase and has cancelled a narrowband

connection, and is waiting for a faster one to be installed. The highest number of Internet dropouts is found in the USA with 20% of respondents saying they used to have a connection at home but do not anymore. In Europe, the countries with the highest drop out rates are the UK, Sweden, and Denmark, all early adopting nations where users have had time to experience a full cycle of Internet use.

2.1.2.6. Users according to online tenure: Percentage of Internet users according to length of time since first use of the Internet

Figure 2.8 On-line tenure by country (EU 15, Switzerland, and the USA)



Survey question A10 . When did you use the Internet for the first time?
(1) < 6 months ago; (2) 6 - 12 months ago ; (3) 1 year - 2 years ago; (4) 2 years + ago; (5) DK
Base: Respondents who accessed the Internet at least once in the last 12 months (N=6905), EU15 results weighted by EU 15 population (N=5828)
Source: SIBIS 2002, GPS. Column percentage.

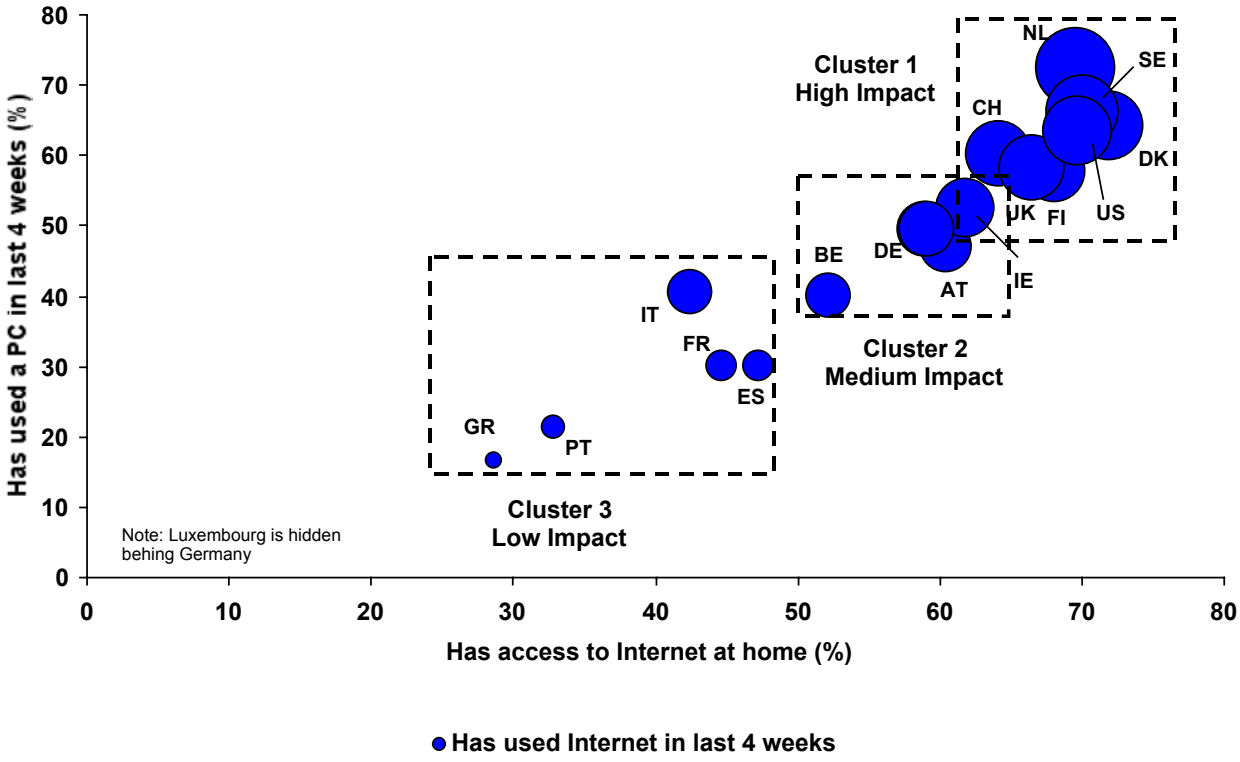
Online tenure is a new indicator which measures share of users according to length of time; tenure, since first use of the Internet. The SIBIS survey classifies tenure into three bands; less than six months since first Internet usage, more than six months but less than two years, and more than two years.

According to the SIBIS results, 'on-line tenure' is highest in the US, Scandinavian countries, Germany and UK, and is generally lower in the Mediterranean countries. These Northern European countries have more experience of usage and also more mature Internet markets. There are also other issues of culture and language. Therefore, it would be expected that Northern European countries have higher rates for Internet penetration rates, e-commerce transactions and e-skills aptitudes. Thus on-line tenure is an important indicator, because, depending on how

experienced users are with the Internet, the more likely they are to use the Internet effectively and widely. It is also more likely that the more experienced users are, the more willing they are to migrate to a broadband connection.

Currently, the measurement used for 'experienced users' in SIBIS is over 2 years, a measure that is already taking in a large proportion of the respondents. In the US for example, the majority of users (78%) have two years or more experience. For future work, it would be interesting to add an additional category which distinguishes early Internet adopters; those respondents who have 5 years plus experience of using the Internet. This would bring a higher scope in the analysis of usage patterns and users profiles, distinguishing between early adopters, experienced users, and the non-experienced.

Figure 2.9 Compound indicator portraying Internet impact across EU15, Switzerland, and the US



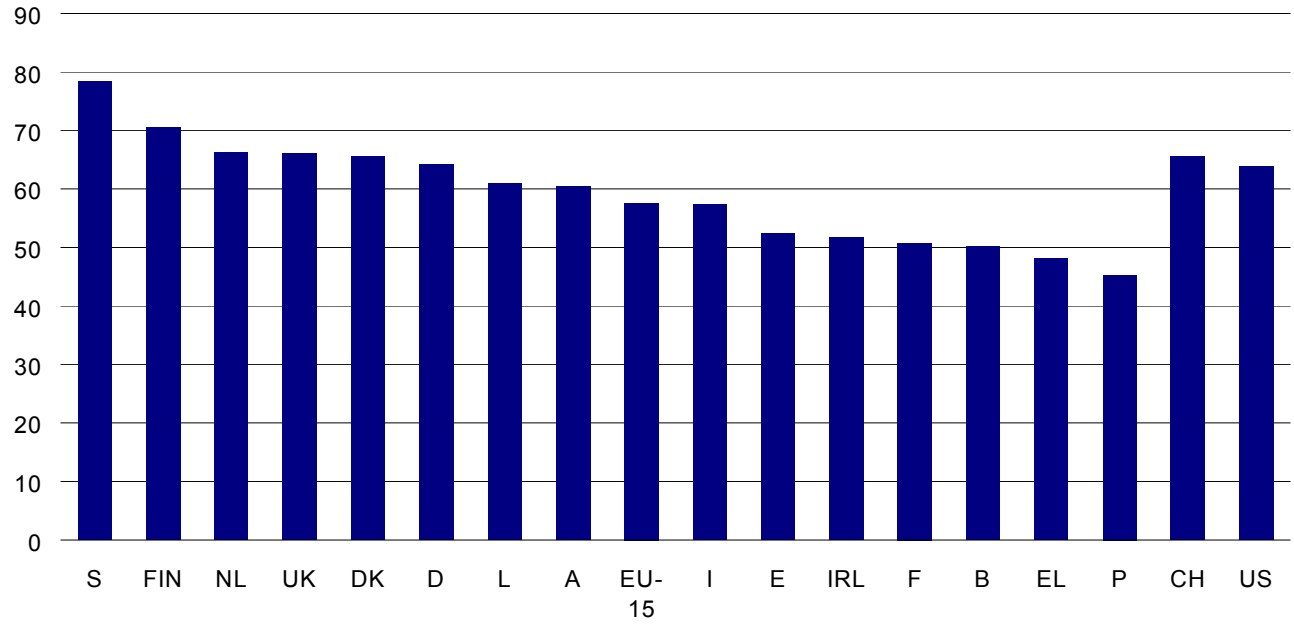
Calculation: Technopolis multivariate analysis of SIBIS GPS 2002
Source: SIBIS 2002, GPS

The Internet snapshot explores Internet access and usage (for both narrowband and broadband connections). The data shows that access to and use of PCs and the Internet is typically twice as prevalent in the 'cluster 1' defined countries as in the 'cluster 3' defined countries. The three variables which form this snapshot (percentage using a PC in the previous 4 weeks, percentage with access to the Internet at home, and percentage using the Internet in the last 4 weeks (active users) appear to offer a useful compound indicator of penetration level. Thus, Cluster 1, which includes highly mature Internet markets such as the US and Scandinavian nations, presents a more dynamic trend than the other two clusters of less developed Internet markets. Additional analysis indicates that most respondents who have used a PC in the last four weeks also have an at-home Internet connection and are active at-home users, since they have also accessed the Internet in the last four weeks. On the contrary, in Cluster 2, and especially in Cluster 3, PC usage

is at a higher level than Internet usage 'within the last four weeks'. It is no surprise that it follows that the measure of Internet at home connections is even lower than that. This factor implies that in Mediterranean countries many PC users do not access the Internet, in the same time period, from anywhere, and also many people who access the Internet do not have an Internet connection at home. Thus they might be accessing the Internet from work, PIAPs (Public Internet Access Points), a friend's house, etc. Hence this is a possible additional factor to explore in future work, particularly when looking at NAS countries where telecom infrastructures are less developed.

2.1.2.7. Internet access and social inclusion: other SIBIS indicators

Figure 2.10 Perceived lack of compatibility between the Internet and the self



Source: SIBIS 2002, GPS. Non [Internet] users were asked if they considered the Internet to be ' something not for *them*'; Survey Question A 18 f (in percentage of internet non users) , SIBIS GPS (Internet is not something for me – agree completely and agree somewhat, respondents not agreeing with the statement are not shown in the above graph). Question relevant N (base is [Internet] non users) for EU 15 = 5525; and 308 for the USA.

Although perceived as well as actual access barriers are contingent to individual circumstances, some barriers might be considered as relatively more important, while others more easily alleviated than others. In this vein, particularly interesting is the barrier based on the perceived incompatibility between self and the Internet, which can be taken as a proxy for those least likely to go online in foreseeable future. As such, it also relates to attitudinal issues as well as to other issues that might impinge upon and/or 'cause' involuntary exclusion from the Internet.

Among other barriers that appear equally relevant in terms of inhibiting access to the Internet for non users is their concern about the mismatch between the level of skills required and [not] possessed by themselves. On average, or taken as a whole, it seems that Europeans perceive a higher mismatch here in relation to their US counterparts. However, there is a significant variation among the EU countries, with for example non users in Portugal more than twice likely to consider that advanced skills are required [for using the Internet] than the UK ones (figure 2.9 below).

2.1.2.8. Socio-economic factors and associated digital divides

SIBIS's general population survey confirmed that most of the socio-economically related exclusion determinants are relevant, and to a great deal apply to the Information Society, and that the digital divides identified in earlier surveys still persist. Thus higher education achievements and higher income levels are positively correlated with higher levels of access to and usage of Information Society products and services.

A longitudinal perspective has also been used by the SIBIS project, which in turn has monitored access to, and use of the Internet over time for specified 'at risk' [from digital exclusion] groups. An additional indicator used was a regular usage of a computer, being the most likely platform for Internet access. Thus longitudinal data was then based on indicators capturing [regular] computer and Internet usage, and Internet access at home which formed a composite measure, (see DIDIX, version 2, composition/comprising variables[4]).

The four specified and monitored groups are;

- women,
- people of more senior age (55 and older)
- people with relatively low education levels (identified by a proxy, which is based on the age at which full time education has been terminated, the at risk group is comprised of those who finished formal education at an age of 15 and below), and
- people on relatively low income levels, measured in relative terms as being in the lowest quartile of the survey respondents.

The participation in the Information Society of each of the above group is captured in the way that conveys inclusiveness (or otherwise), since each index value describes the percentage of Internet and computer users (both general 'users' and 'at home users') among the risk group as a percentage of users in total population. It is possible then to monitor each '*at risk*' group at the EU level and across member States, but also to arrive at an indication of overall inclusion/exclusion, through using the aggregated, compounded values (again, both at the EU and the member State level). Admittedly, this picture is based on four determinants only – gender, age, education and income – but while it is being recognised that a position of disadvantage can be traced to other determinants, the above ones are arguably more suitable for cross-country comparisons.

In terms of an aggregate index value, which combines individual digital divide indices at the EU level, there appears to be little change (and progress) over time. However, it is reassuring to consider both values for DIDIX comprising indices as well as the values for individual countries. Thus the picture concerning the gender digital divide is encouraging, where trend is apparently decreasing at the EU level, although not for all countries. Similarly, the age divide also shows an overall trend towards decreasing although only of late[5]. On the other hand, a less encouraging

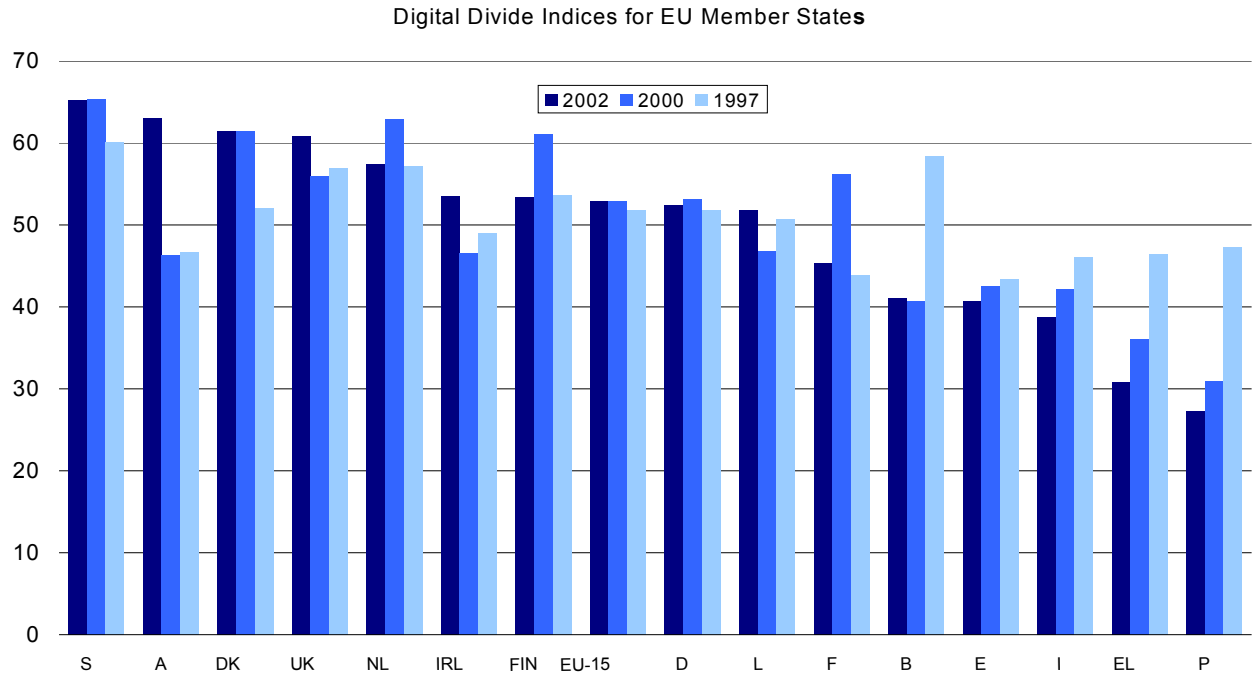
[4] DIDIX composition:

Indicator	*Definition / source*	*Weight*
Percentage of computer users	Data are based on the SIBIS GPS survey question (A 1): "Have you used a PC, Mac, or any other computer, for work or for private purposes – in the last four weeks?	50%
Percentage of internet users	Data are based on the SIBIS GPS survey question (A 7): "Have you used the internet at least once in the last four weeks, at home, at school, or work or at any other place?"	30%
Percentage of internet users at home	Data are based on The SIBIS GPS survey question (A 5): "Do you have access to the Internet in your home?"	20%

[5] This may be consistent with a 'biological ' explanation - as more current information society participants get older, a continued progress can be expected in this area, based on the assumption that the usage will persist. Of course , nobody should be happy with the pace of this progress and there is a huge scope and justification for policy intervention in this area.

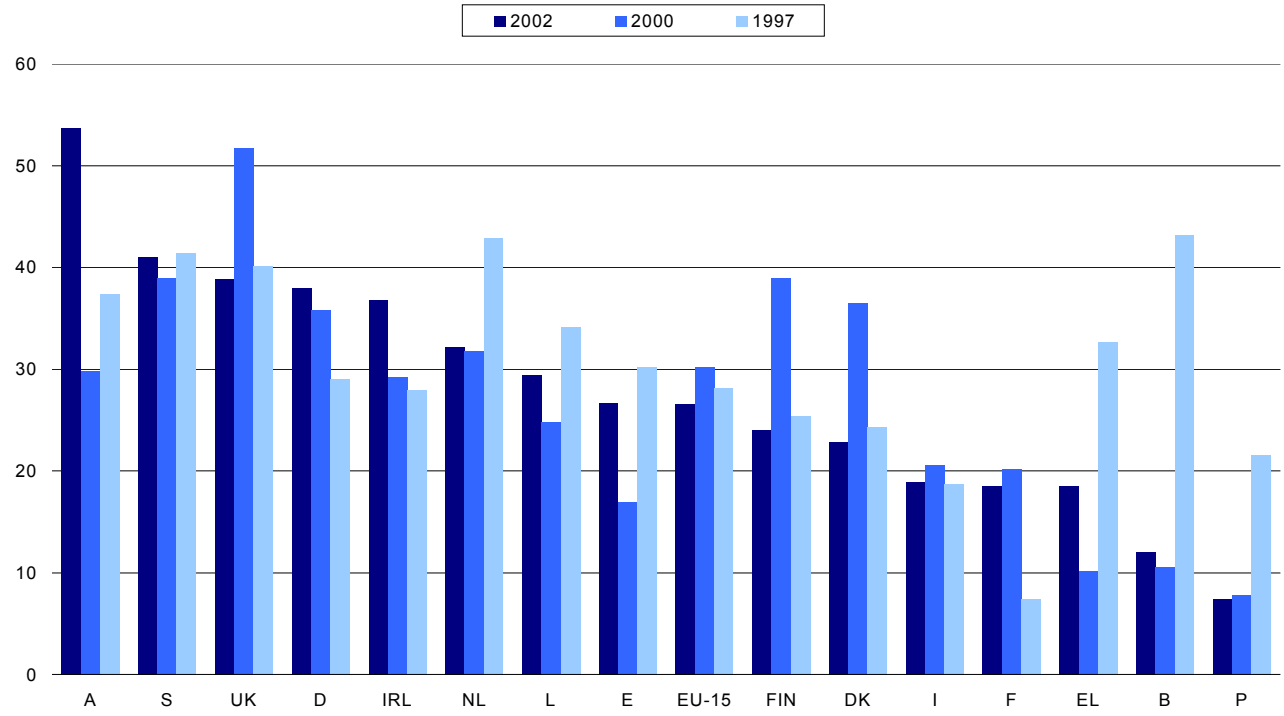
trend has been identified regarding education and income divides. Thus the size of the education divide has remained very large, and the Figure 3.13 below conveys a rather stark message concerning the importance of education for the (levels and intensity of) participation in the Information Society. The education divide at the EU level has remained large over the last five years, and it even increased in some Member States. This appears to be the most relevant policy challenge facing the EU in terms of boosting participation for all in the Information Society.

Figure 2.11 Digital divide for 'at risk groups' over time in the EU Member States (1997-2002)



Note: (DIDIX v.2 index values are depicted for 1997, 2000, and 2002)
Source: SIBIS 2002, GPS, Eurobarometer 54.0, 2000, and Eurobarometer 47.0, 1997.

Figure 2.12 Digital education divide over time, in the EU Member States



Source: SIBIS 2002, GPS, Eurobarometer (54.0) 2000, and Eurobarometer (47.0) 1997.

The values for the indices are for the [ratio of users] of ' low education level group' i.e. people who finished formal education at an age of 15 and/or below.

2.2. Enterprises' access to and use of the Internet

2.2.1. EU policy goals and definitions

The eEurope 2005 Action Plan, whilst outlining a number of areas that need to be addressed, such as e-confidence, e-commerce tax, and privacy, the main policy thrust is of "raising productivity and growth through investment in information and communication technologies" (eEurope Action Plan 2005, p14). Hence, to chart the progression to a more e-enabled economy, five statistical indicators have been identified by the Commission.

The main policy indicator proposed by the eEurope 2005 for enterprise access captures the diffusion of ICTs through measuring "the percentage of persons' employed using computers connected to the Internet in their normal work routine". This appears quite an elementary indicator; however, in some job roles using a PC, and whether this activity constitutes being part of the *normal work routine* may be a particularly difficult phenomenon to establish. To overcome this issue SIBIS collected data on the ability of a person to access an Internet connected PC at work, whether they be in paid employment or otherwise. This data was then elaborated against how long the user spent using the Internet at work, ranging from no time, to one, two… up to twenty hours per week.

With the four supplementary indicators, the first three are quite rudimentary and have therefore been gathered within the SIBIS study. The first supplementary indicator (B2), covers the "percentage of enterprises having access to the Internet", and dovetails the main policy indicator to provide data on the general diffusion of the Internet, which when compared to employee access is particularly interesting as it reveals issues of staff access (or e-inclusion). The second supplementary indicator, "percentage of enterprises having a website/homepage" (B3) indicator, provides information on enterprises which have gone past the initial phase of an Internet connection and provide information online. Similarly, the inclusion of "percentage of enterprises using an Intranet/extranet" (B4) indicator provides a perspective on the type of networks enterprises are investing in, internally or externally focussed.

Part of a dynamic economy requires the workforce to be flexible, accessing IT systems from various locations is one element of this, and so this is included in the Commission's benchmarking indicator – B5. This indicator was not covered in SIBS, fortunately, a study commissioned by DG Enterprise (the European e-Business Market Watch project)[6], which recently examined 15 economic sectors across the EU does have data on this indicator. The study, undertaken by partners within the SIBIS consortium, provides additional data and perspectives on activities identified by the eEurope Action Plan 2005.

[6] Information and results are available at www.ebusiness-watch.org

Table 2.2 The EC's eEurope 2005 benchmarking indicators and SIBIS's equivalent/supplementary indicators

e-Europe 2005 benchmarking indicators	SIBIS indicator
Policy indicators: B.1 Percentage of persons employed using computers connected to the Internet in their normal work routine **Definition:** Broken down by enterprise size (10-49; 50-249; 250+) and activity (NACE section D, F, G, H, I, J, K, 92.1, 92.2) **Sources:** Eurostat/NSI ICT enterprise survey **Frequency:** Annual **Supplementary statistical indicators:** B.2 Percentage of enterprises having access to the Internet B.3 Percentage of enterprises having a website/homepage B.4 Percentage of enterprises using Intranet/ Extranet B.5 Percentage of enterprises with persons employed working part of their time away from enterprise premises and accessing the enterprise's IT systems from there.	**Enterprise access to the Internet Indicators** 1. Persons employed using computers connected to the Internet at work **Definition**: Respondents using the Internet from work by employment status. Cross analysed against respondents who have accessed the Internet in the last 4 weeks, by time spent (no time, < 1hr., 1-5hrs., 6-10hrs, 11-20hrs., >20hrs.) **Collection Date:** GPS: May 2002 for EU 15, US, & CH DMS: May 2002 for EU7 (D, F, UK, E, FIN, EL) **Other Indicators**: 2. Percentage of enterprises having access to the Internet. 3. Percentage of enterprises having a website/homepage. 4. Percentage of enterprises using Intranet/ Extranet

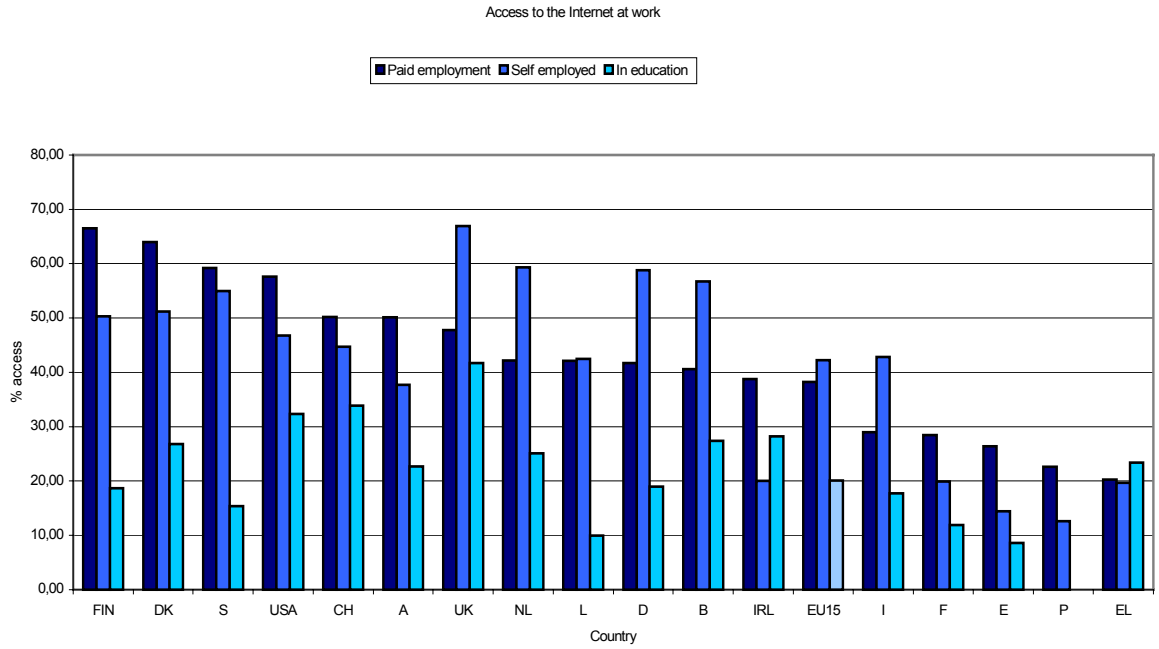
Source: eEurope 2005 & SIBIS.

2.2.2. Results from SIBIS

2.2.2.1. Persons employed using computers connected to the Internet at work indicator

SIBIS's indicator was segmented into paid, self employed, and in education status. This segmentation revealed some interesting results, especially in terms of US and EU comparisons. Whilst on average, the EU lags behind the US by some 12%, the profile of the EU is in encouraging. Within the EU, self employed access leads paid employment access. It is interesting that the leading countries all have higher access for paid employment, probably as a result of large firm investment in those countries. The middle ground displays high self employed access profiles (dominant in the UK, the NL, D, B, and I), whilst those with generally lower uptake show significant differential between employment statuses (except EL). The inclusion in education is interesting in terms of potential future growth and skill potential within enterprises. It is interesting that the top three member states have similar access (in education) as Greece.

Figure 2.13 Access to Internet services at work: ranked by access. Segmentation includes paid employment. self-employed, and in education statuses



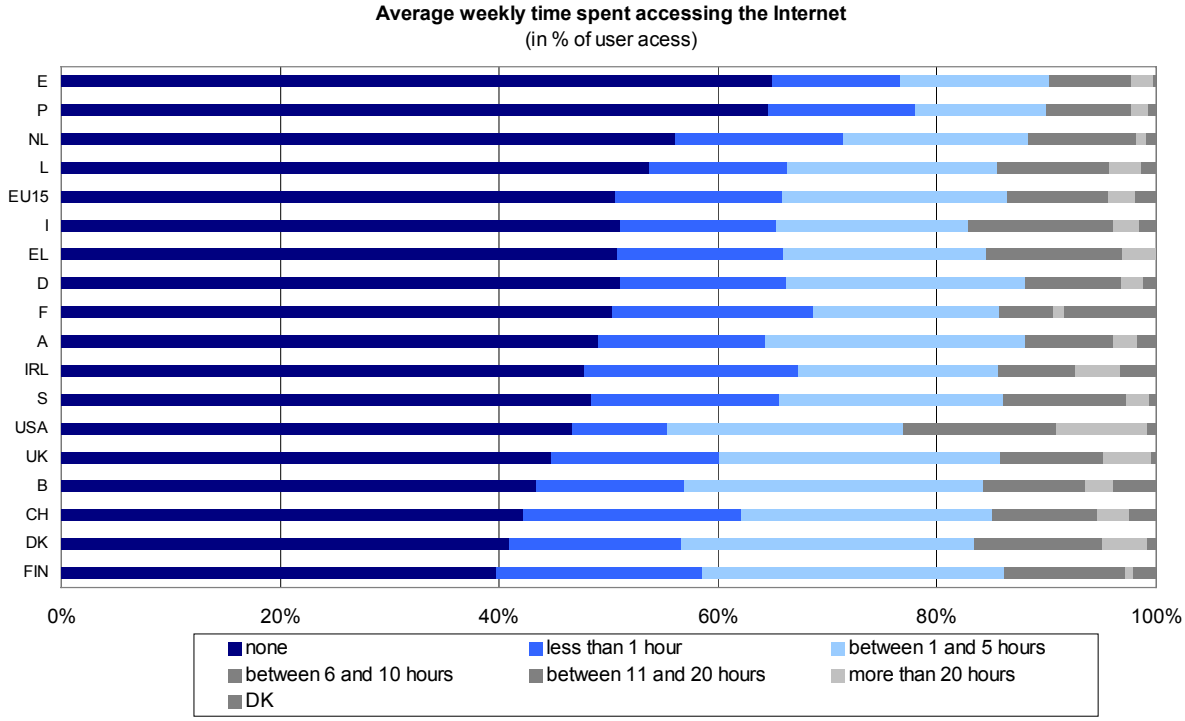
Base: respondents using the Internet from work by employment status. Weighted results, EU15 weighted by EU15 pop.
n=all respondents=11,832; EU15 n=10,306.
Source: SIBIS 2002, GPS

Looking more specifically at country positions, the survey revealed that the EU's Nordic countries lead the US for both paid and self employed status access to the Internet. As stated previously, countries in the middle ground appear to do well in terms of the self-employed accessing the Internet. It may be fruitful for further research to investigate what drivers are enabling those member states that have put in place such significant Internet connections for the self employed. Italy and France lead the countries with low Internet access, with Spain and Portugal following behind – supporting a northern/southern European divide. Greece is interesting in that it has near convergence across all work activities.

As the preceding chart does not entirely consider those utilising the Internet in their normal work routine, further elaboration was required. This was undertaken by ascertaining, through asking respondents to state in an average week, how often they used the Internet at work. SIBIS's results illustrate that overall, five of the EU's member states have higher access than the US. Admittedly, the US does have around a tenth of employees utilising the Internet for over 20 hours per week – double the nearest EU country. In terms of the main field, there is just over 10% differential between those displaying above average employee access. Some countries did display limited access when compared to the EU15, especially by the Iberian Peninsula. The big four economies display limited deviation from the EU average, while Scandinavian countries rate highly against it. Within some European countries, it appears that employees are not sure of whether they have access to the Internet, most notably in France, Ireland and Belgium.

When comparing work to general (home) access, the results are interesting. The Netherlands, Sweden, Denmark and US lead, showing strong correlation to work access. Therefore, there are significant issues, in terms of propagating home access for those countries where enterprises have limited access to the Internet, or do not allow staff access. Notably, these are Spain, Portugal, and Greece.

Figure 2.14 Average weekly time spent accessing the Internet at work by country
Question: How much time do you spend in a typical week on using the Internet ... [item]



Base: respondents who have accessed the Internet in the last four weeks at work (N=5944). EU15 results weighted by EU15 population (N=4985).
Source: SIBIS 2002, GPS

Supplementary statistical indicators

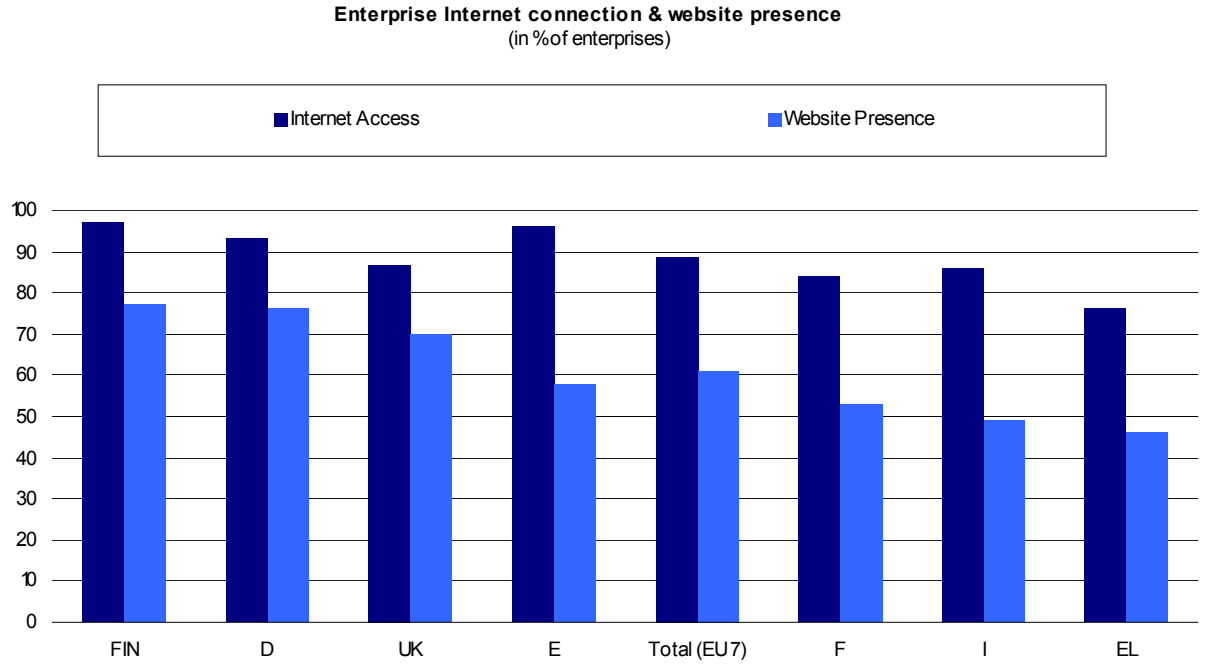
2.2.2.2. Enterprises having access to the Internet

The first supplementary indicator, "enterprise access to the Internet", shows good uptake with the EU 7 average approaching 90% - knowing that in terms of access, Finland and the UK provide a good performance benchmark relative to the US. On the whole, Internet accesses by enterprises correlates with employee access, demonstrating good ICT inclusion. The exceptions are Spain and Germany, which show slightly higher enterprise use relative to employee access.

Comparing website presence, the indicator B2, with Internet connection shows a close correlation, where access to the Internet, as anticipated, supersedes enterprises' web presence by an average of 16%. A widening gap between the two activities does appear as Internet access falls. This possibly illustrates that a significant amount of experience and penetration, which creates some sort of industry inertia, is required to support web based activity.

In terms of the spread of performance, Internet connections correlate to employee access, with around a 20% differential between the highest and lowest uptake. Conversely, in terms of website presence, there is limited correlation between employee access and website use. Therefore, it appears that internal ICT usage is not wholly dependent on establishing a website presence.

Figure 2.15 Organisations within the EU7 having access to the Internet and a website presence benchmark
Question: Does your establishment have access to the World Wide Web? Does your establishment put information on the Internet, for example by means of a website?



Base: all establishments (n = 3,139), weighted according to employment
Source: SIBIS 2002, DMS

In terms of European progress within the last 2 years, it appears that there has been significant progress. The UK's web presence has grown from 15% in 1997, with France climbing from 10%, whilst Germany's enterprises jumped from 15% to 78% within 4 years (Spectrum NOP Survey, 1997).

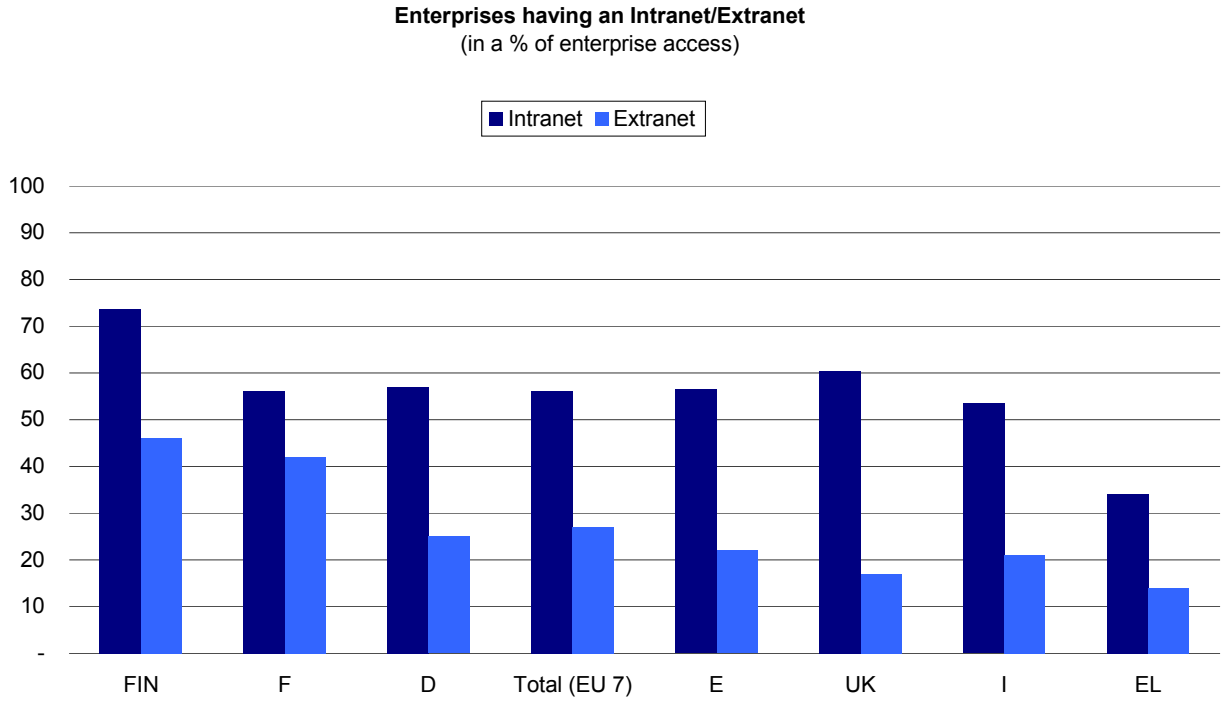
2.2.2.3. Enterprises having access to an Intranet/Extranet

Intranet and extranet connections provide a crucial network for data exchange between and within organisations. Intranets are used as a means of exchanging information within the company, where as extranets are primarily used between suppliers and customers, and are therefore a good bellwether of more complex enterprise interconnectivity.

Intranet and extranet uptake is less diffused than Internet connections, with an EU 7 average presence of 56%. The diffusion of intranets and extranets appears to be broadly consistent with the size of enterprises within the survey sample (which is consistent with the respective country's enterprise characteristics), with Finland having 37% of establishments over 500 employees, compared to Greece's 10%. Being more sophisticated, these types of networks tend to be

championed by large firms, and therefore it is not surprising that Finland, France, and Germany do well, especially in extranet activities. Whilst Finland's position stands out, penetration (of an Intranet) is relatively uniform, except for Greece. This is consistent with Greece's economic profile, with its bias towards small enterprises. Again, and not surprisingly, when enterprise infrastructure presence is compared to employee accesses, there is good correlation, highlighting that on average employees are not being excluded from the benefits of ICT investment.

Figure 2.16 Enterprises having an intranet/extranet benchmark
Question: Does your establishment have an Intranet? Does your establishment have an Extranet?



Base: all establishments (n = 3,139), except for Extranet (n = 1,925), weighted according to employment
Source: SIBIS 2002, DMS

Useful insights would be provided by a breakdown of NACE activities and size class as recommended by eEurope 2005 benchmarking. The e-Biz Market W@tch research revealed significant differences between large and small firms when it came to employees access to email, Internet and extranet uptake, which varied between 26%, 14.5%, and 49% respectively between large and small enterprises – a significant differential.

2.3. Conclusions

The indicators developed by SIBIS in the field of Internet access and usage, whilst providing similar information to those proposed by eEurope 2005, yielded further interesting perspectives and comparisons to the US. SIBIS confirmed the continuation of an encouraging trend towards increasing penetration of the Information Society in everyday activities. More than half (54.4%) of the EU population aged 15 years and older used the Internet within the 12 months prior to the survey, up over 4% from 2001. Also, SIBIS discovered that whilst the EU has made good progress in access by alternate platforms, however users at home in the US were consistently accessing the Internet through more diversified platforms than in the EU. In terms of access locations, the EU has a similar profile to the US (at home, work, and educational institution), with the exception of Public Internet Access Points (PIAPs); with charged PIAPs being more popular in the EU.

In examining other indicators, not included in eEurope 2005, SIBS found online tenure interesting, being highest in the US, Scandinavian countries, Germany and the UK, and generally lower in the Mediterranean countries. On-line tenure was found to be an important indicator because experienced users were more likely to navigate the Internet with increased effectiveness, and be more willing to migrate to a broadband connection.

SIBIS also considered societal exclusion, or the digital divide in the IS, and initial analysis indicates that gender, those with lower income levels, the unemployed, and older citizens perceive or face more barriers to the Internet. The picture was not always consistent, with mixed trends in Europe. Age and gender displayed a closing gap, with education and income widening since 1997.

SIBIS's revealed that within enterprises the EU's Nordic countries lead the US in terms of employee and self employed status for access to the Internet. Apart from the Nordic countries, the UK, the Netherlands, Germany, and Belgium excel in self employed Internet access – all above the US – an encouraging trend. The trend however supports a north/south European divide, with Greece being interesting in that it has near convergence across all work activities. On the whole this shows employees are not being excluded form the benefits of ICT investment, but this may not be the case across the spectrum of enterprise size classes.

3. Modern Online Public services

3.1. e-Government

3.1.1. EU policy goals and definitions

Under the *e*Europe 2002 Action Plan, Member States agreed to provide all basic services online by the end of 2002. Much has been achieved in this area, but still many services have limited interactivity. The aim of the Commission in the eEurope 2005 Action plan is for all Member States to have interactive basic public services by the end of 2004, where relevant. The Commission and Member States will agree on a list of public services for which this interactivity and interoperability are desirable.

The EC policy goal for public procurement is that by the end of 2005 the Member States should carry out a significant part of public procurement electronically. Other goals are that all citizens should have easy access to PIAPs in their communes/municipalities, the aim to have broadband connections for all public administrations by 2005. By the end of 2003 the Commission will issue an agreed interoperability framework to support delivery of pan-European e-government services to citizens and enterprises.

For e-government the Commission defined a policy indicator in the eEurope 2005 programme that is a continuation of the policy indicator that was already defined in the eEurope 2002 programme[7]. The policy indicator, the supplementary statistical indicators and the additional indicators, as proposed by the Commission are summarised below.

As the eEurope policy indicator concentrates on the supply-side of e-government, availability and level of sophistication of online services, the SIBIS indicators complements this by addressing the demand-side of e-government, not only usage but also perceptions and barriers to utilisation as the following table shows:

- the SIBIS preference indicator complements on the policy indicator D.1;
- the SIBIS awareness and usage indicator provides some results related to the supplementary indicator D2;
- the SIBIS attitude indicator measures the perception of advantages and barriers.

The SIBIS indicators measure acceptance and adoption of e-government by its intended users, so they closely match the eEurope 2005 initiative to assess the feasibility of including impact indicators in the benchmarking exercise.

[7] The methodology used for collecting information on availability will be the same as that used for eEurope 2002.

Table 3.1 The EC's eEurope 2005 benchmarking indicators and SIBIS's equivalent/supplementary indicators

e-Europe 2005 benchmarking indicators	SIBIS indicators
Policy indicator: D.1 No. of basic public services fully available on-line **Definition:** 20 basic services as approved by the Internal Market/Consumers/Tourism Council of 12 March 2001 for the first eEurope benchmarking exercise. **Source:** Commission study in co-operation with Member States **Frequency:** Annual, first deliverables October 2003, second October 2004, third October 2005, with as reference period 1st quarter 2003/4/5 **Supplementary statistical indicators:** D.2 Percentage of individuals using the Internet for interacting with public authorities broken down by purpose (purposes: obtaining information, obtaining forms, returning filled in forms) D.3 Percentage of enterprises using the Internet for interacting with public authorities broken down by purpose (purposes: obtaining information, obtaining forms, returning filled in forms) **Additional indicators to be the subject of pilot studies with a view to examination of their feasibility at the mid-term review or earlier if possible:** D.4 No. of available basic public on-line services with integrated digital back office processes D.5 Public procurement processes that are fully carried out online (electronically integrated) in % (by value) of overall public procurement D.6 Percentage of public authorities using open source software	**E-government indicator:** Preferred Way Interacting with Government Services **Definition**: Citizen's preference to interact with government via online services or via the traditional way (face-to-face, phone) for 7 basic government services for citizens. **Source**: GPS, SIBIS 2002 **Other SIBIS indicators** Awareness of Availability of online Government Services Use of Online Government Services. Attitude towards electronic government services.

Source: eEurope 2005 and SIBIS

3.1.2. Results from SIBIS

The realisation of e-government depends on two complementary aspects. First, the vision of e-government dictates the types of services that must be available online and the level of sophistication they must achieve. Second, the adoption of e-government by its intended users requires careful preparation, although this is not always possible, as the development of e-government may seem to just happen at times. Ideally, development is based on a thorough understanding of how users perceive e-government, how well they can complete expected transactions, and what barriers stand in the way of successful adoption. The knowledge gained by studying both sides of e-government—vision, acceptance and adoption—provides a necessary foundation for its successful implementation.

Within SIBIS, citizens' preferences for, access to, usage of, and attitude toward e-government are examined.

3.1.2.1. Preferred Way Interacting with Government Services, Awareness of Availability of Online Government Services and Use of Online Government Services

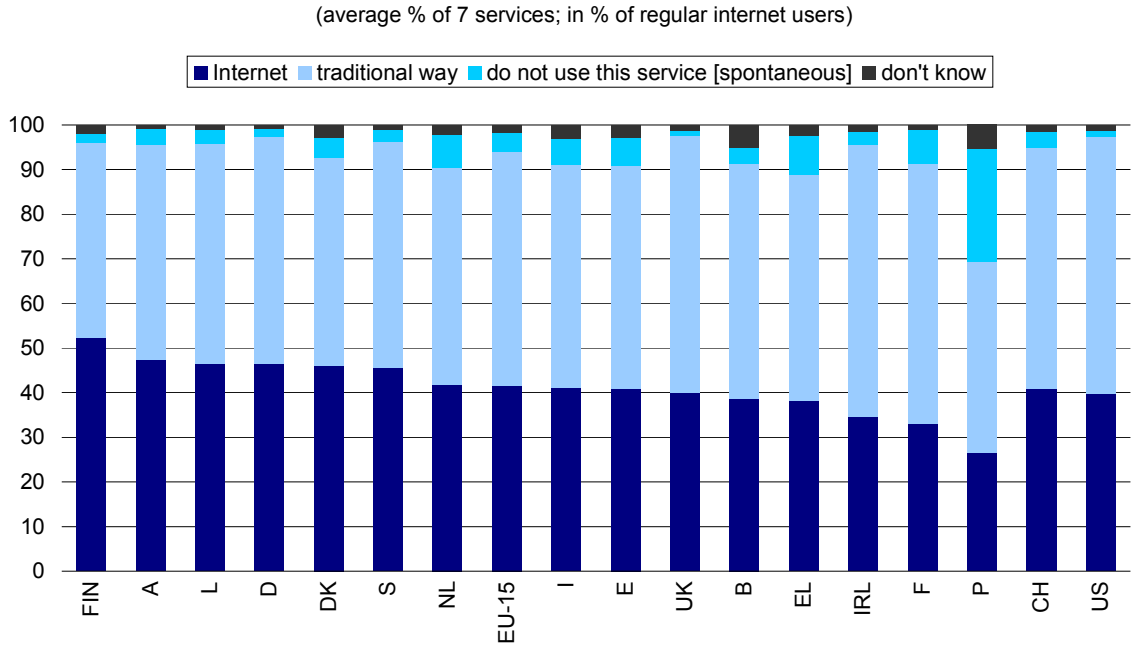
As the policy indicator as proposed by eEurope 2005 measures the availability in terms of level of sophistication of online services, the SIBIS indicator measures the preferences of citizens to use those services. This indicator provides some interesting information of the willingness of people to use those online services.

SIBIS distinguishes seven basic services for citizens:

- Income tax declaration
- Search for job
- Request for personal documents
- Change of address
- Search for books in public libraries
- Declaration to the police
- Car registration.

Figure 3.1 Preferred way of interacting with government services by country, averaged across all seven services

Question: Here is a list of activities that require citizens to get in touch with public administration. For each activity, please answer whether you would prefer to use the Internet or prefer to use the traditional way, that is face-to-face, by postal mail, fax or phone….



Base: All regular Internet users (N=5944), averaged across 7 services.
Source: SIBIS 2002, GPS

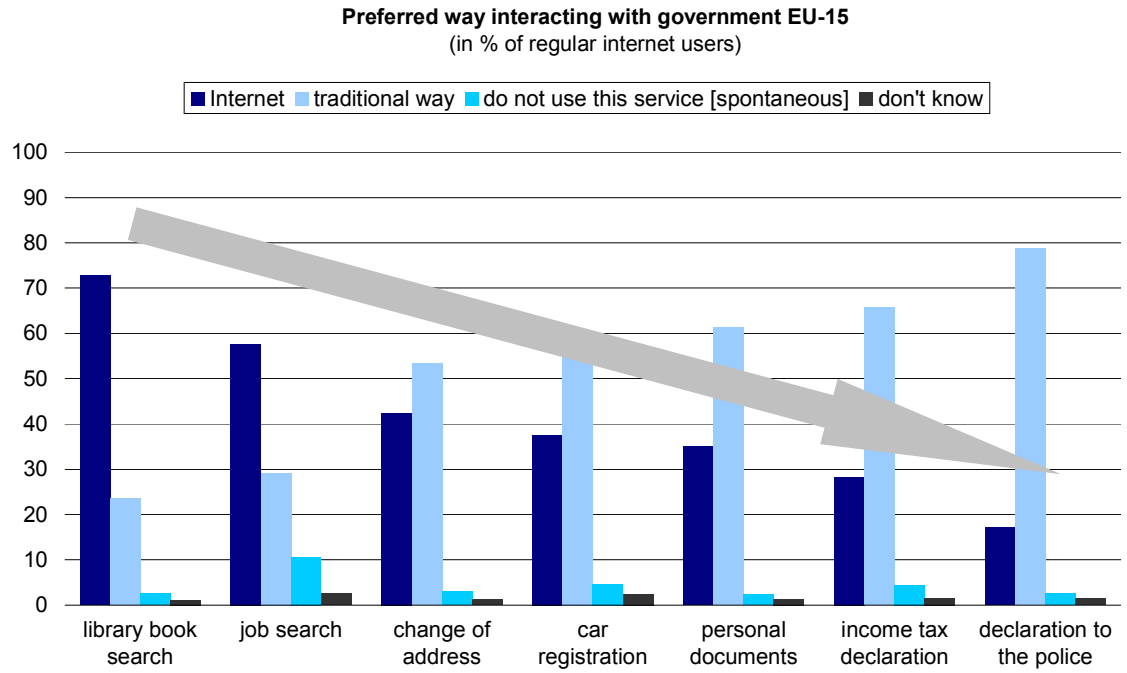
The cultural variety of the EU may combine with other factors to influence the interest in e-government of EU citizens in each of the Member States. Many externalities that vary from one Member State to the next influence the preference of respondents for e-government, these were not investigated through the survey. For this reason, differences in the preferred way of interacting with government that are seen across the EU cannot be explained. The limited scope of the

questions presented to the respondents in the survey makes it difficult to speculate about what influences the preference for e-government across the EU. However, the results suggest that further study may prove fruitful in understanding why citizens may opt for or reject using e-government.

Generally, respondents from northern countries of Europe show a greater preference for interacting with government using the Internet. Their preference is also higher than what was reported in Switzerland and the US.
The preference for online or traditional access to government services varies across the services of interest. SIBIS discovered that citizens are interested in some aspect of e-government, showing a significant preference for some e-government services over their traditional counterparts. Preference was not uniform, however. Thus, for example, the online search for books available in public libraries, which requires minimal information about the user, rates a high preference. The use of job search services can also be carried out by revealing minimal information about the user and tends to be rated fairly highly by respondents.

Continuing the progression from relatively anonymous services to ones that require a great deal of personal information, the announcement of a change of address gives relatively little information about an individual although this is more than for the two other services listed up to now. Least preferred is the declaration to police, which potentially requires that a great deal of private information be divulged. These findings are summarised in Figure 3.2, according to the amount of personal information required. The distance between services is not an objective measure of the difference in the amount of information they require, but instead reflects their ordinal rank.

Figure 3.2 Preferred Way Interacting with Government services in Europe (EU-15)
Question: Here is a list of activities that require citizens to get in touch with public administration. For each activity, please answer whether you would prefer to use the Internet or prefer to use the traditional way, that is face-to-face, by postal mail, fax or phone….

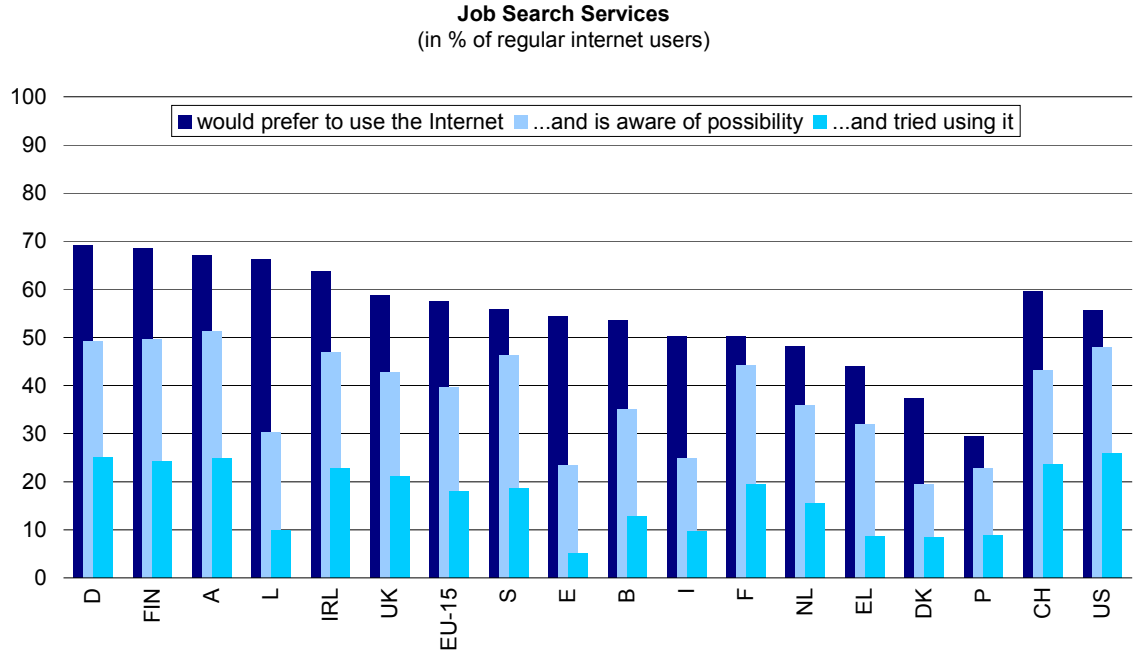


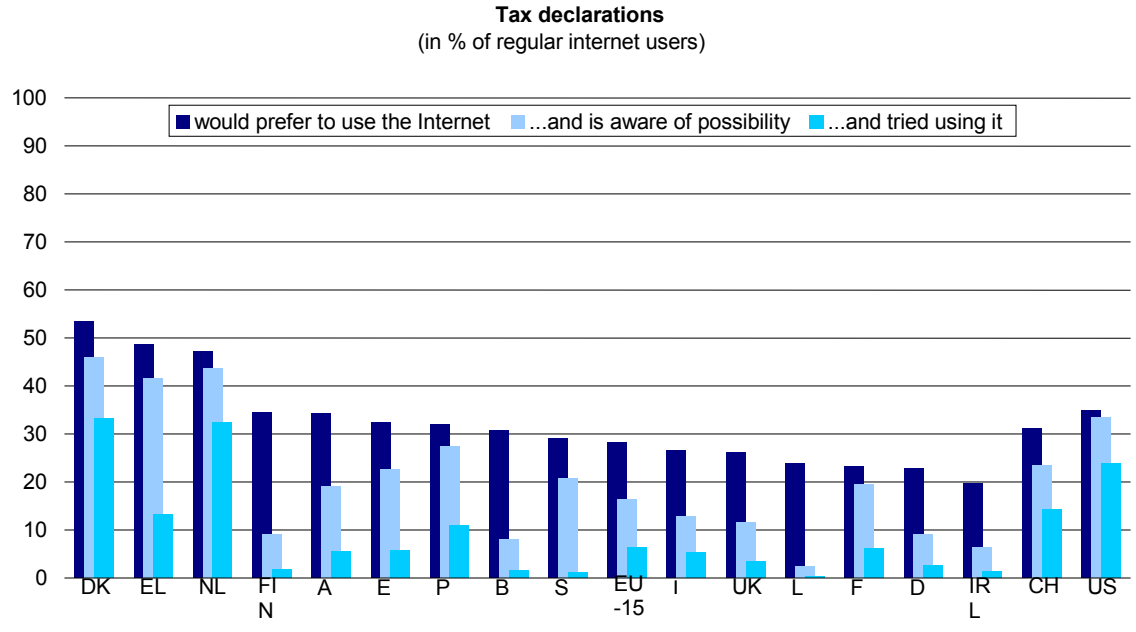
Base: All regular Internet users (N=5944),averaged across EU-15 countries (weighted by EU15 population)
Source: SIBIS 2002, GPS

Among respondents who indicated a preference for online government services, citizens were not always aware of which government services were available online. The general pattern appears to be that citizens were well aware of e-government services requiring little or no personal information while they were not sure of whether those requiring a great deal of personal information were available to them. The exception to this pattern was income tax declaration, which over half of respondents identified as available to them. Examples provided include preference, awareness and usage of services related to job search and tax declaration.

Further narrowing the subset of respondents to those who not only preferred online services, illustrates the problem of the divulgence of personal information. Income tax declaration online, although requiring much personal information, has been used by nearly half the respondents.

Figure 3.3 **Preference to use Internet for Interacting with government services, the awareness of availability of those services by people who prefer the Internet and the use of those services by people who prefer the Internet and are aware of the availability in the region where they live in Europe (EU-15)**
Questions: Here is a list of activities that require citizens to get in touch with public administration. For each activity, please answer whether you would prefer to use the Internet or prefer to use the traditional way, that is face-to-face, by postal mail, fax or phone…. People who said to prefer to use the Internet for this service where asked. Have you ever tried using the Internet for this?





Base: All regular Internet users (N=5944 country results weighted, EU 15 weighted by EU15 population
Source: SIBIS 2002, GPS

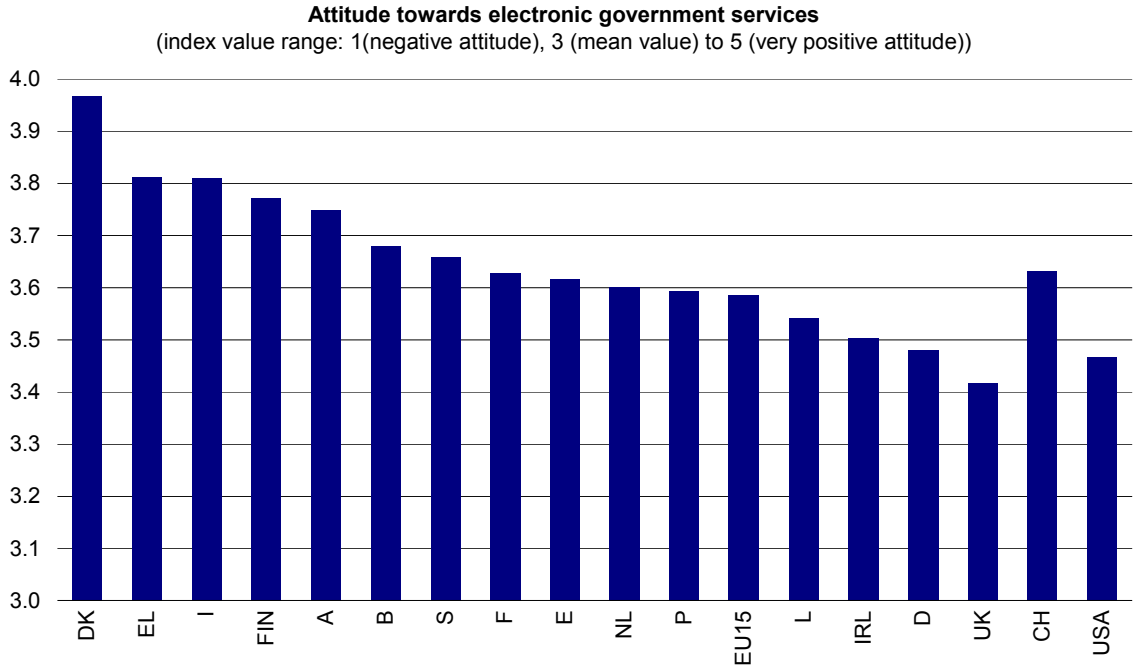
3.1.2.2. A SIBIS impact indicator: Attitude Indicator

An interesting element to know is whether people are willing to use the Internet for government services and what they see as the main advantages and drawbacks of those Internet services. The attitudes of citizens toward e-government point to convenience of time and location as factors that strongly favour e-government over traditional government. In addition, citizens felt that e-government is faster than traditional government. Nearly half of respondents did not feel that e-government services are difficult to use. The responses of citizens were more neutral regarding the usefulness of e-government, whether its use requires special equipment or whether fewer mistakes arise as a result of its use.

Looking at responses for individual countries, important differences exist regarding preference for e-government, access to it and its use. Likewise, attitudes are not uniform across all countries. The next figure shows the SIBIS Attitude indicator, based on people's combined responses to a series of questions on perceived usefulness, advantages and disadvantages of e-government services[8]. Overall, there is a lot of variation across Member states, the Danish citizens show the highest value for the Attitude Indicator, indicating the most positive attitude towards e-government. The base for these attitude indicator are people who use the Internet regularly, this means that in developing countries like for example Greece, there is a propensity for a bias by early adopters to be generally more positive towards electronic services.

[8] The indicator combines 8 items, 4 positive (online public services are faster than traditional methods, reduce the number of mistakes by public authorities, make it possible to deal with public authorities at more convenient times and at more convenient locations) and 4 negative (online public services are not useful enough, require you to install special equipment or software, do not seem as safe as traditional ways, are difficult to use). The responses to the questions are summed and combined in such a way that agreement with statements which describe advantages, and disagreement with statements that describe barriers regarding e-government make the attitude indicator increase. The value of the indicator ranges between 1 and 5: 5 means that citizens show a very positive attitude towards e-government.

Figure 3.4 Attitude towards electronic services, SIBIS GPS 2002 (N=5944), country results weighted
Question: For each of the following statements about online services of public administration, please indicate whether you agree. Public services on the Internet ...[item]: (a) are not useful enough;(b) are faster than the traditional way;(c) require that you install special equipment or software;(d) reduce the number of mistakes public authorities make;(e) do not seem as safe as using the traditional way;(f) make it possible to deal with the authorities at more convenient times;(g) make it possible to deal with the authorities at more convenient locations, e.g. from home or from the workplace;(h) are difficult to use



Answers: (1) agree completely (2) agree somewhat (3) do not agree (4) Don't Know

Base: All regular Internet users (N=5944 country results weighted, EU 15 weighted by EU15 population
Source: SIBIS 2002, GPS

3.1.3. Conclusions

The proposed indicators gave valuable, complementary information about the demand-side of e-government, the preferences, awareness and attitude of citizens towards e-government. The results show that overall, the services which do not require users to reveal a great deal of personal information about themselves are more popular, although this problem is not insurmountable as online tax declarations showed. European citizens were also quite clear on the benefits of e-government, stating convenience of location, ease of use, and time as being the drivers for use. Another important issue is citizens' awareness, it appears that citizens are more aware of e-government services requiring little personal information. This is interesting information for policy makers, as e.g. it does not make sense to develop and invest in innovative electronic government service if there is little awareness of it.

3.2. e-Learning

3.2.1. EU policy goals and definitions

EU policy goals in the area of e-learning are defined along two different lines;

- E-learning in the education system,
- E-learning for work and skills.

In eEurope 2005 the 'program for e-learning' is one of the five proposed actions in the e-learning section. The focus in this action is the implementation of the objectives of the e-Learning Action Plan[9]. A central element of the e-Learning action plan is to develop systems to train students and pupils as well as adults to become digitally literate. This has not been operationalised into proposed indicators by the EU. In SIBIS a number of indicators and an index of Digital Literacy have been developed, in accordance with the understanding in the e-Learning Action Plan and the e-Learning summit, which distinguishes between digital literacy and higher order skills of the Information Society[10].

A natural benchmark indicator in relation to this is the actual level of digital literacy in the population. This could be seen as an indication of the population's readiness to use the digital literacy skills, or in general terms measurement of outcome of the systems to train the population in becoming digitally literate. No such indicator has been proposed by the EC, but in the SIBIS project a number of indicators and an index of Digital Literacy have been developed, in accordance with the understanding in the e-Learning Action Plan and the e-Learning summit[11]. The SIBIS index of Digital Literacy measures the status of digital literacy in the population as confidence in communicate via the internet, download and install software, search wanted information at the internet and to question the information from the internet[12].

With respect to e-Learning the EC intends to implement the objectives of the e-Learning Action Plan to run from 2004 – 2006. The EC "will also publish an analysis of the European market for e-learning, including the private sector. It will review the market situation and analyse legal, economic and social issues with a view to identifying obstacles to the development of the e-learning market in Europe and where necessary make proposals to remedy them" (eEurope 2005, p. 7).

The EC policy goals for work-related e-learning include the intention to "launch actions to provide adults (e.g. the unemployed, women returning to the labour market, etc.) with the key skills needed for the knowledge society, to improve their employability and overall quality of life. These actions will take advantage of the possibilities offered by e-learning" (eEurope 2005, p. 7).

9 COM(2001)172 final: The eLearning Action Plan, Designing tomorrow's education
10 Ibid and European Commission (2001): Digital Literacy workshop. A discussion paper from the eLearning summit on digital literacy. Brussels 10-11 May 2001
11 Ibid and European Commission (2001): Digital Literacy workshop. A discussion paper from the eLearning summit on digital literacy. Brussels 10-11 May 2001
12 Note: The index differ from most Eurostat/NSI surveys in focussing on competence level (in accordance to self evaluation), while others often focus on actual use within a certain period of time.

Table 3.2 The EC's eEurope 2005 benchmarking indicators and SIBIS's equivalent/supplementary indicators

e-Europe 2005 benchmarking indicators	SIBIS indicator
Policy indicator: E.1 Number of pupils per country with Internet connection (broadband/non-broadband) **Definition:** Only computers used for teaching purposes to be included **Source:** Commission study **Frequency:** Annual, with as reference period 3rd quarter 2003/4/5 **Supplementary statistical indicators:** E.2 Percentage of individuals having used the Internet in relation to training and educational purposes - broken down by: formalised educational activities (school, university etc.); post-educational courses; other courses related specifically to employment opportunities E.3 Percentage of enterprises using e-learning applications for training and education of employees	**e-Learning indicators:** 1. Students use of e-learning 2. Students Digital Literacy 3. General population Digital Literacy **Definition:** Expressed as confidence in communicate via the internet, download and install software, search wanted information at the internet and to question the information from the internet. Represented through a COQS index **Source**: GPS **Collection Date:** GPS: May 2002 for EU 15, US, & CH DMS: May 2002 for EU 7 (D, F, UK, E, FIN, EL) **e-learning indicators for work and skills** 4. Percentage of individuals having used the Internet in relation to training and educational purposes 5. Use of electronic learning materials in company-internal computer systems or on the Internet, in the course of your training and learning in the last four weeks 6. Percentage of enterprises using e-learning applications for training and education of employees 7. Engagement in some kind of self-directed learning related to your work, in the last for weeks **Source** GPS/DMS

Source: eEurope 2005 & SIBIS

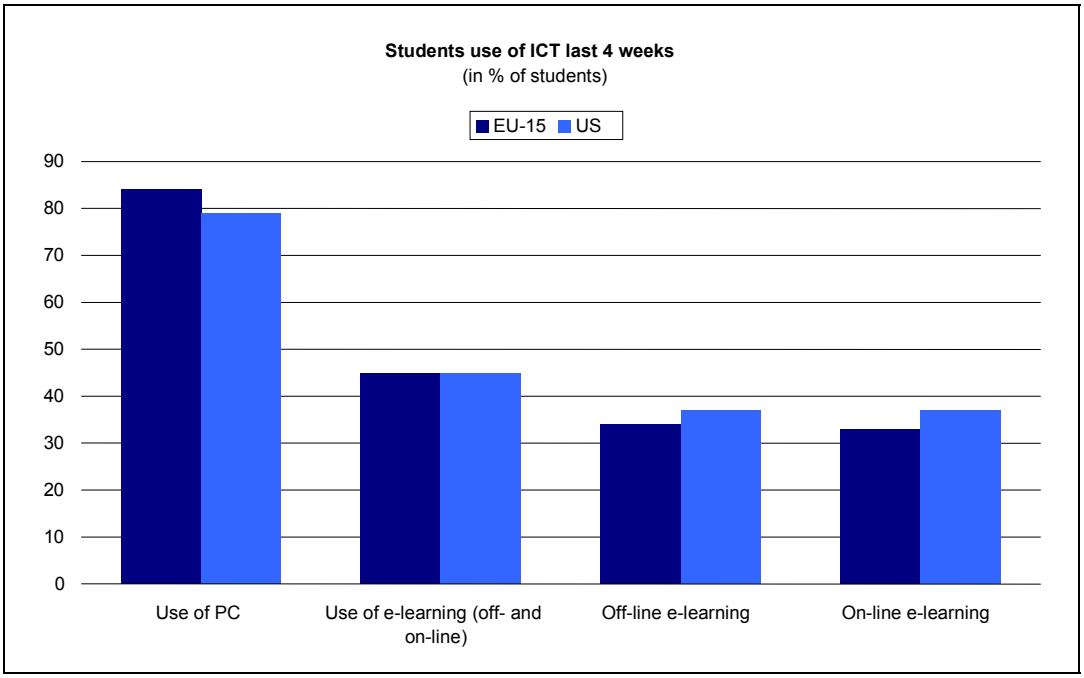
3.2.2. Results from SIBIS in e-learning in the educational system

3.2.2.1. E-learning in the educational system in SIBIS: students' use of e-learning

Students' use of e-learning indicates the actual intensity in use of e-learning materials, on-line as well as off-line. A student's use of e-learning materials is an indication of the integration of ICT in education seen from the student's perspective. The e-learning materials are divided in two groups of technologies: offline learning materials (CD-ROMs or other medias such as diskettes, audio or video tapes etc.) and online learning material (provided on the internal computer system of the school/university or through the Internet).

The use of e-learning among European students is at almost the same level as students from US (due to relative low level of students, especially in US, the differences are not significant). Among all persons still studying, 45% in the EU 15 have used e-learning within the last 4 weeks. Of the students, 33% have used on-line e-learning materials, while this seems to be a little higher in US. Due to the low level of respondents, it is not possible to break down the EU result on member states for further benchmarking.

Figure 3.5 Students use of e-Learning the last 4 weeks in EU 15 and US
Question: Did you use, in the course of your studies in the last four weeks, electronic learning material such as learning programmes on CD-ROM, on the internal computer system of your school/university or through the Internet? If yes: What did you use? [online or off-line materials]



Base: All persons still studying EU15 N=1372, US N=193.
Source: SIBIS 2002, GPS

3.2.2.2. Students digital literacy

The SIBIS index of Digital Literacy (COQS-index) measures the status of digital literacy among students as their confidence in communicate via the internet, download and install software, search wanted information at the internet and to question the source of information from the internet[13]. This understanding of digital literacy as a highly communicative literacy is based on the understanding from the e-learning action plan and the e-learning summit[14]. The COQS-index indicates at a scale from 0 to 3 the level of digital literacy, with 0 for not being 'very confident' or 'fairly confident' in any of the four skills and 3 being 'very confident' in all the four skills.

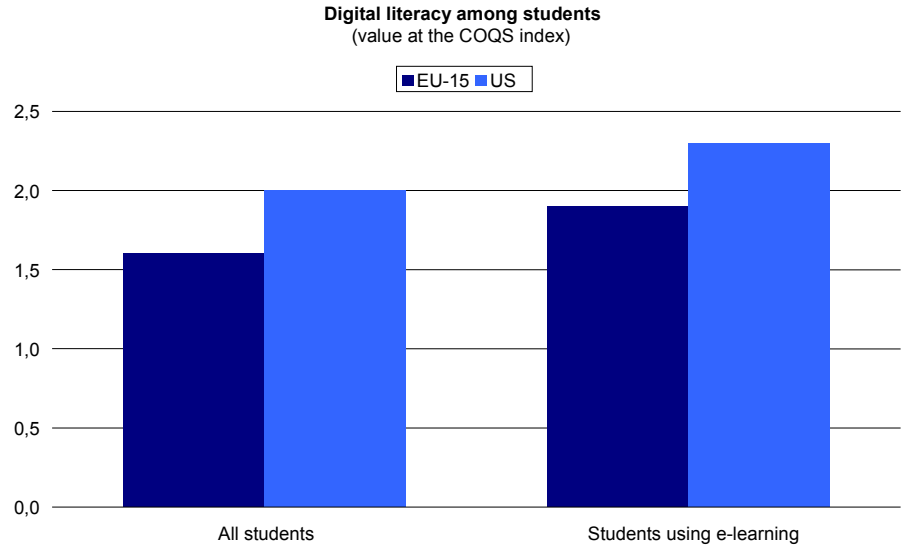
On basis of the SIBIS General Population Survey, the level of digital literacy among all persons still studying in the 15 EU- countries is 1.6 at the COQS-index. Despite of a low level of respondents the level of digital literacy is tentatively measured to 2,0 among students in USA[15]. Focussing on the students having used e-learning within the last four weeks the value at the COQS index raises to 1.9 (with the level among US-students using e-learning is 2,3). Due to the low level of respondents, it is not possible to break down the result on member states for further

[13] The index differ from most Eurostat/NSI surveys in focussing on competence level (in accordance to self evaluation), while others often focus on actual use within a certain period of time.
[14] European Commission (2001): Digital Literacy workshop. A discussion paper from the eLearning summit on digital literacy. Brussels 10-11 May 2001
[15] Only 193 studying respondents in the USA

benchmarking. The level of student digital literacy is, not surprisingly, higher than in the population in general and among all youth (age up to 25).

Figure 3.6 Students level of digital literacy. Value at the COQS-index among all students, students using e-learning

Question: How confident would you feel in: using a search engine; find information on the Internet; sources of information; using e-mail; using Internet chat-rooms to contact other people, (f) creating a personal web/Internet page, (g) downloading and installing software onto a computer



Base: All Students, EU15: N=1372, US: N=193, Students using e-learning EU15: N=610, US N=87
Source: SIBIS 2002, GPS

3.2.2.3. E-learning and digital literacy: general population

In the knowledge-based society, being able to communicate and work digitally is as basic as the ability to read and write. All groups of society, regardless of age, gender, educational background, etc., must have the opportunity to take part in the societal processes of living, working, and learning to avoid any kind of social exclusion or biases in the labour market. Digital Literacy is focussing especially on communicative digital skills, as confidence in using the Internet for certain functions and having a minimum of tools for assessing the value of information provided on the Internet.

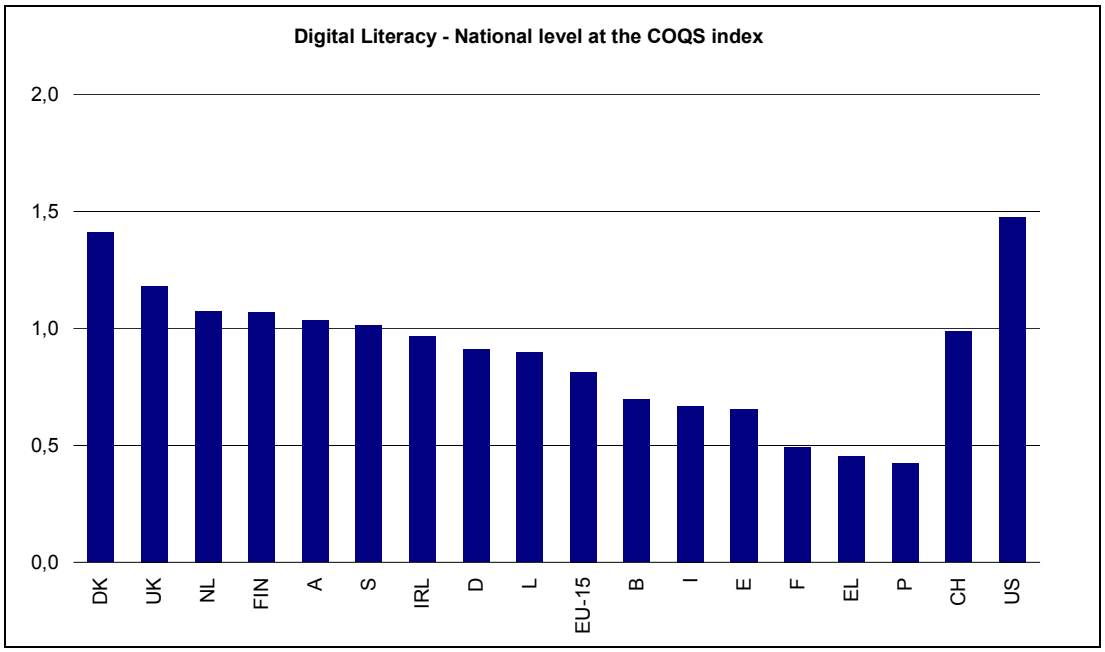
The COQS index of digital literacy is based on an indication of four skills: communicating with others via the internet, obtaining (or downloading) and installing software on a computer, questioning source of information from on the Internet and searching for the required information on the internet.

The COQS-index indicates at a scale from 0 to 3 the level of digital literacy, with 0 for not being 'very confident' or 'fairly confident' in any of the four skills and 3 being 'very confident' in all the four skills. Digital Literacy indicates the readiness of the population to use the internet for work and as active participant in the information society. In this regard US is well ahead of EU (an average COQS index value of 1.5 to 0.8). A few northern member states are near the level of US. A north-

south division in level of Digital Literacy is a reality, with Belgium, Italy, Spain, France, Greece and Portugal with the lowest level of Digital Literacy among the total population.

Figure 3.7 Digital Literacy at national level. Level of digital literacy of the COQS index. EU member states and US and Switzerland

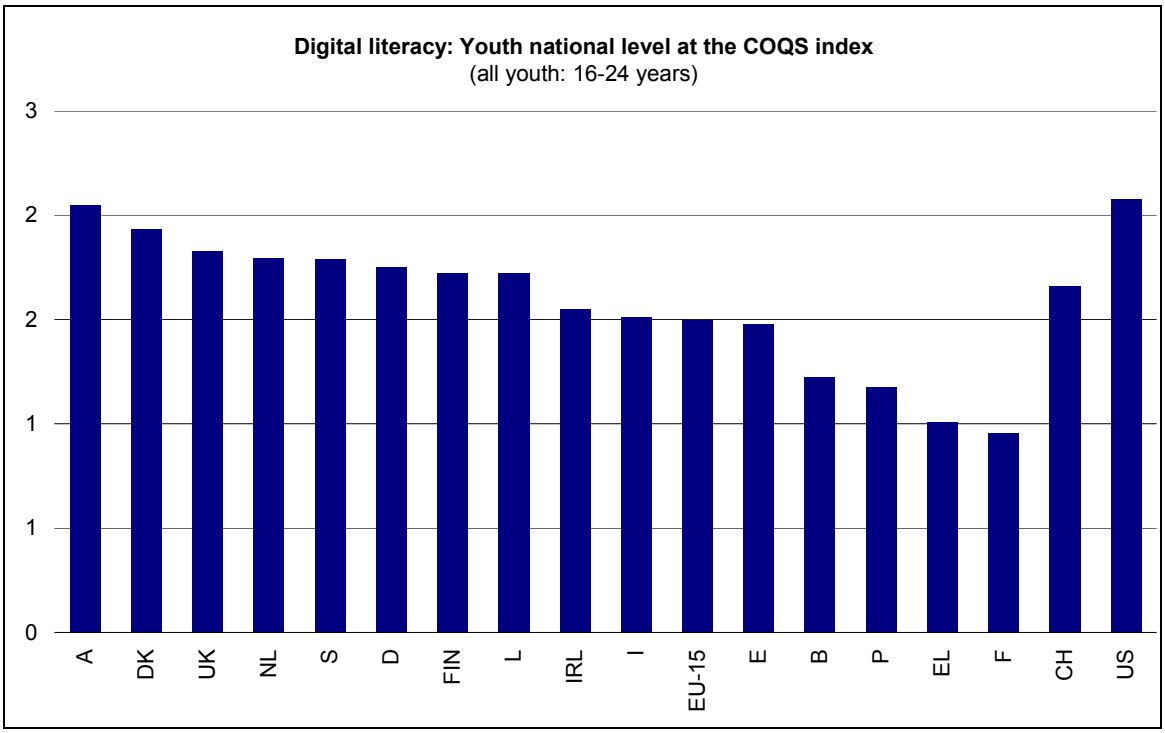
Question: How confident would you feel in: (a) using a search engine to find information on the Internet, (b) identifying the source of information provided on the Internet, (c) using e-mail to communicate with others, (d) using Internet chat-rooms to contact other people, (f) creating a personal web/Internet page, (g) downloading and installing software onto a computer



Base: total population (N=11.832)
Source: SIBIS 2002, GPS

The picture is more positive, if only the youth (age up to 25 years) are examined. In this case the differences between the EU countries is diminishing, from a factor 3 between the highest and the lowest scoring best EU country to a factor of 2. Still France, Greece, Portugal and Belgium is below the EU-average.

Figure 3.8 Digital Literacy among youth at national level. Level of digital literacy at the COQS index. EU member states and US and Switzerland
Question: see above

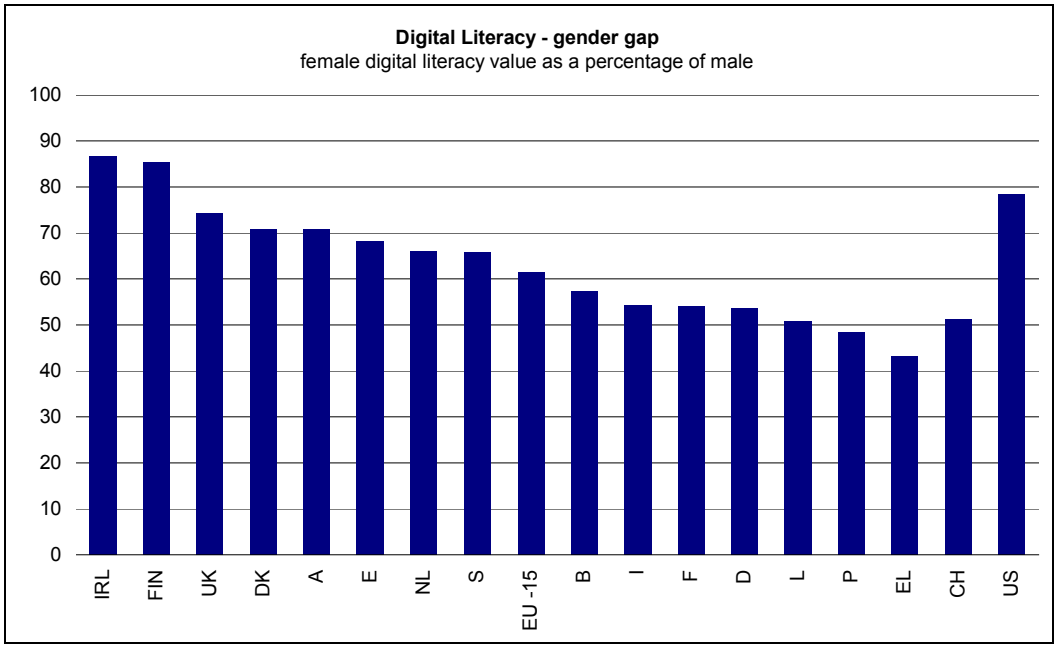


Base: All youth, age 16 to 24 (N=1.964)
Source: SIBIS 2002, GPS

3.2.2.4. Gender gap in digital literacy

Digital Literacy skills are unevenly distributed between men and women – in all EU states and US. In general, states with a low level of Digital Literacy in the total population also show the largest gender gap in digital literacy. It is though remarkable that Ireland and Finland which are a in the upper middle with regard to total Digital Literacy show the most equality between men and women.

Figure 3.9 Gender gap in regard digital literacy (based on the COQS-index). National level and EU 15
Question: See above



Base: all N: 11.832
Source: SIBIS 2002, GPS

3.2.3. Results from SIBIS in e-learning for work and skills

SIBIS has developed indicators which provide data and results for the E2 indicator ("Percentage of individuals having used the Internet in relation to training and educational purposes") and on the use of e-learning by individuals ("Use of electronic learning materials in company-internal computer systems or on the Internet, in the course of your training and learning in the last four weeks"). This can be differentiated according to status as well as the participation of individuals in work-related training courses responding to the statistical indicator E.3 ("Percentage of enterprises using e-learning applications for training and education of employees").

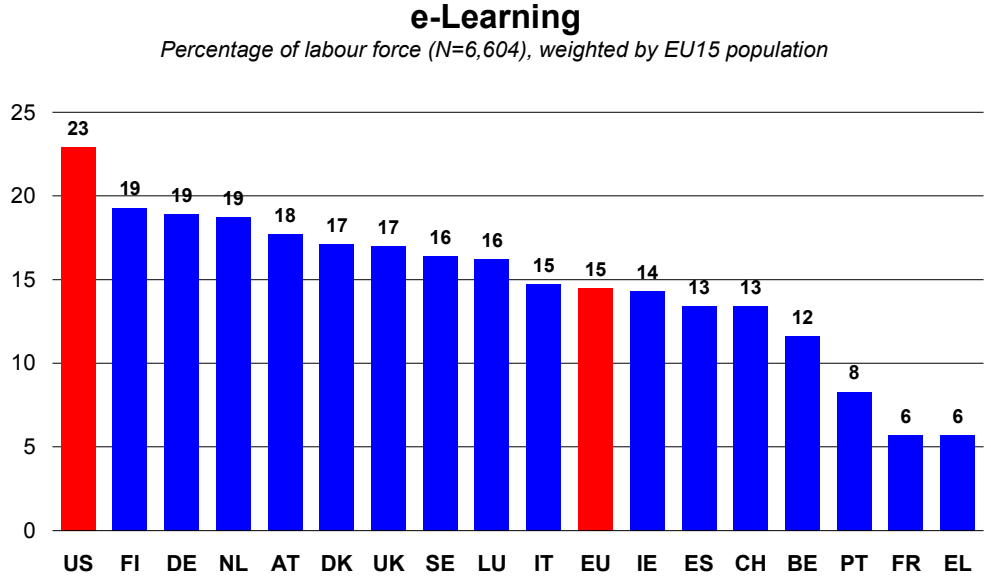
A further indicator "Self-directed training" ("Engagement in some kind of self-directed learning related to your work, in the last for weeks") was developed by SIBIS and data on this obtained allowing for a differentiation by status (e.g. labour force, employee, unemployed). This indicator provides some interesting information on and insights into the preparedness and willingness of individuals for life-long-learning. It also is in line with the EC objective to give the labour force the chance to become digitally literate through life long learning, and to increase IT training places and courses and promote gender equality.

3.2.3.1. e-Learning at work

e-Learning can play a decisive role in delivering learning systems which meet the demands of today's workers -- and unemployed. We distinguish between two broad groups of e-learning technologies: offline e-learning (comprising multi-media learning material such as computer programmes on diskettes, video tapes and CD-ROMs) and online e-learning (learning content being provided online through the Internet or the computer network of the employing organisation

or school/university). The share of the labour force that uses e-learning is 15% on average in the EU and 23% in the US, making the US the benchmark for European countries. There are rather large deviations across the countries with Greece and France at the tail end with just a third of e-learning intensity among the labour force compared to the leading European countries like Finland, Germany, the Netherlands and Austria but also Denmark, the UK, Sweden and Luxembourg.

Figure 3.10 Use of e-Learning in Europe and the US 2002
Question: Did you use, in the course of your training and learning in the last four weeks, electronic learning materials such as learning programmes on CD-ROM, in company-internal computer systems or on the Internet? (1) yes (2) no (3) DK
What did you use? Did you use (a) CD-ROMs or other so-called offline media such as diskettes, audio or video tapes etc.? (b) online learning materials provided on the internal computer system of your organisation or through the Internet? FOR EACH (1) yes (2) no (3) DK



Base: labour force (N=6,604); weighted. EU average weighted by EU15 population
Source: SIBIS 2002, GPS

3.2.3.2. e-learning and participation in work-related training courses

Acquisition of skills increasingly takes place throughout the working life. Therefore "Participation of individuals in work-related training courses" is the SIBIS indicator used to shed some light on the training activities by companies. Again, the results are striking with, for instance, a threefold higher share of individuals participating in work-related training in Finland and 2.5 times higher share in countries like Denmark and the Netherlands compared to Greece and Portugal. The US again ranges at the top together with Finland. The SIBIS data also suggests that the skills gap between the current workforce and the unemployed is going to widen because of the extent to which persons in employment are engaged in company-provided training, learning by doing and also self-directed learning. It seems that the training provided by the state to the unemployed cannot make up for the provision of learning opportunities companies supply to the employees.

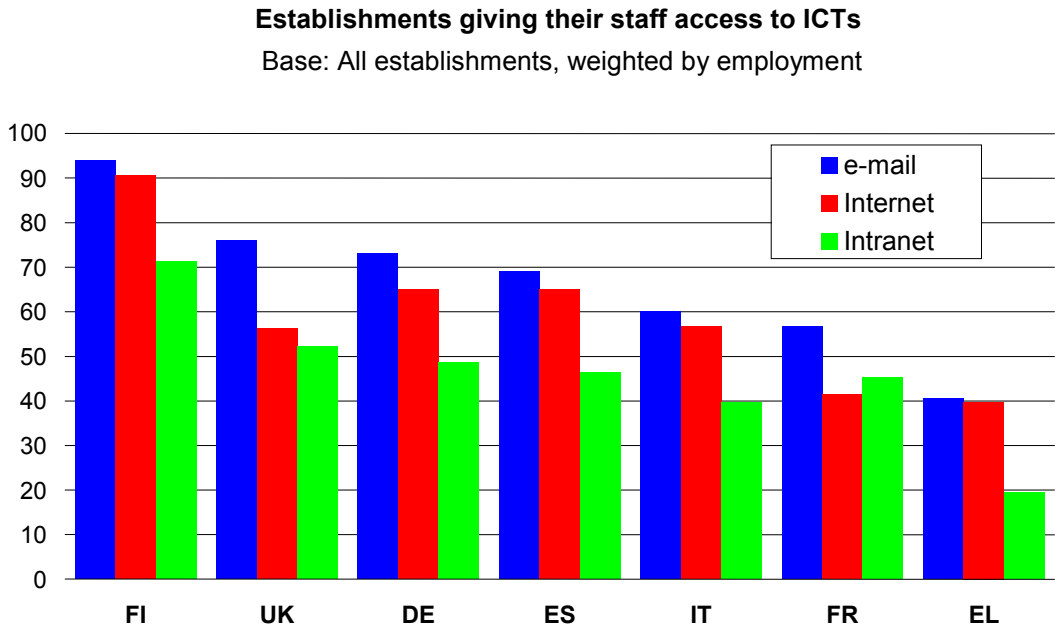
When combining the results of this indicator with the one on e-learning for the EC countries it becomes apparent that there is a strong relationship between these two indicators: the higher the participation in work-related training courses, the higher the use of e-learning tools. The German-

speaking countries, Scandinavia, the Netherlands and the UK find themselves in the top performing group together with the USA being the benchmark. These findings also correspond to the results of research from the e-business watch project (www.ebusiness-watch.org) which discovered that 19% of the European companies use online technologies for e-learning.

3.2.3.3. ICT user skills provision

ICT user skills can be provided via more or less formal training measures but experience shows that in any case, user experience is needed. This is usually being acquired through regular working with these applications as a working tool. An important indicator, therefore, is the share of the workforce which has access to ICTs at their working place. SIBIS data shows that between 40% (Greece) and 91% (Finland) of EU employment is in companies which grant their staff free access to the Internet.

Figure 3.11 Establishments Giving Their Staff Access to ICTS in Europe 2002
Question working: DMS
Which applications can be accessed by the majority of your office workers? Can the majority of your office workers … send e-mails to external addresses?… browse Internet sites? …**B13:** … browse intranet sites?
FOR EACH (1) yes (2) no (3) DK



Source: SIBIS 2002, DMS

The commitment with which Finnish companies let their employees use e-mail and surf the Net can be assumed to be one reason for the success of the country in the European information economy.

3.2.4. Conclusions

The indicators developed by SIBIS produced valuable insights and harmonizing information about the more general development of digital literacy and factors of motivation in participating in such activities. SIBIS showed that the higher the participation in work-related training courses, the

greater the demand for e-learning tools. Therefore, progression to an Information Society appears to require a more generally receptive and progressive training and education culture by enterprises. But the push side from enterprises is not the only element, the demand side from individuals is crucial. It appears that intrinsic motivation for [life-long] learning is also an important factor for the use of e-learning tools. Therefore, policy is probably best advised to take a two pronged complementary approach; increasing motivation and incentives not only at the enterprise side, but also at the demand side, highlighting the benefits of e-learning solutions. This should ensure an improved re-skilling of the workforce for the knowledge society.

3.3. e-Health

3.3.1. EU policy goals and definitions

The EU has been supporting research and development in health telematics for more than 10 years, under the framework of the IST programme and its predecessors. This corresponds with the increasing information intensity of sophisticated medical equipment and computer applications. Against a background of increasing healthcare budgets, medical and scientific advances, an ageing population and changing expectations, ICTs are expected to open up new opportunities by reducing administrative costs, delivering health care services at a distance etc. Another important action already underway which will be contributing to eEurope 2005 is to improve the use of telematics in the community pharmaceutical regulatory system. Both citizens and health care providers are increasingly using ICTs and online services. Take-up by general practitioners is of particular interest as they are the cornerstones of most health services. Online health services for citizens are also mushrooming, from information on healthy living and illness prevention to electronic health cards. This is the backdrop to the eEurope 2005 benchmarking indicators on citizens and general practitioners (see below).

Table 3.3 The EC's eEurope 2005 benchmarking indicators and SIBIS's equivalent/supplementary indicators

e-Europe 2005 benchmarking indicators	SIBIS indicators
Policy indicators: F.1 Percentage of Population (aged 16 and over) using the Internet to seek health information whether or not for themselves or others. Health information to include injury, disease and nutrition. (F.2[16] Percentage of general practitioners using electronic patient records) **Definition:** Health information to include injury, disease and nutrition. Frequency: daily, weekly, monthly, rarely, never, Demographic data: age, gender, Breakdown between general searches and those for named practitioner online. If named practitioner, purpose of communication: make appointment, request prescription, or seek medical advice **Source:** New survey, Eurostat/NIS household survey **Frequency**: Annual	**e-Health indicators:** 1. Percentage of population (aged 15 and over) using the Internet to search for health-related information whether or not for themselves or others. **Definition**: To include any health-related information. Frequency: whether done in defined reference periods - last 4 weeks, last 12 months. Demographic and socio-economic data: health status, age, gender, household type, age finishing education, income, employment status, occupational group. Differentiated by reasons for searching - to be better informed on own general health, to seek second opinion on own or other's medical diagnosis, to support role as carer. **Source:** GPS **Collection Date:** GPS: May 2002 for EU 15, US, & CH **Other SIBIS indicators:** 2. Percentage (of those who searched) who found health-related information 3. Percentage (of those who searched and found information) who found information suitable for their needs. 4. Percentage (of those who found suitable information) who had to use non mother-tongue web sites. 5. Ratings (by those searching online for health-related information) of trustworthiness of various information providers - universities and other non-profit organisations, pharmaceutical companies, private health insurance companies, patient advocacy and self-help groups, hospitals, professional medical associations.

Source: eEurope 2005 & SIBIS.

3.3.2. Results from SIBIS

Overall, the indicators developed within SIBIS were found to work well. They could be operationalised for purposes of the SIBIS general population survey and yielded good quality data. The main results for these indicator topics are summarised below.

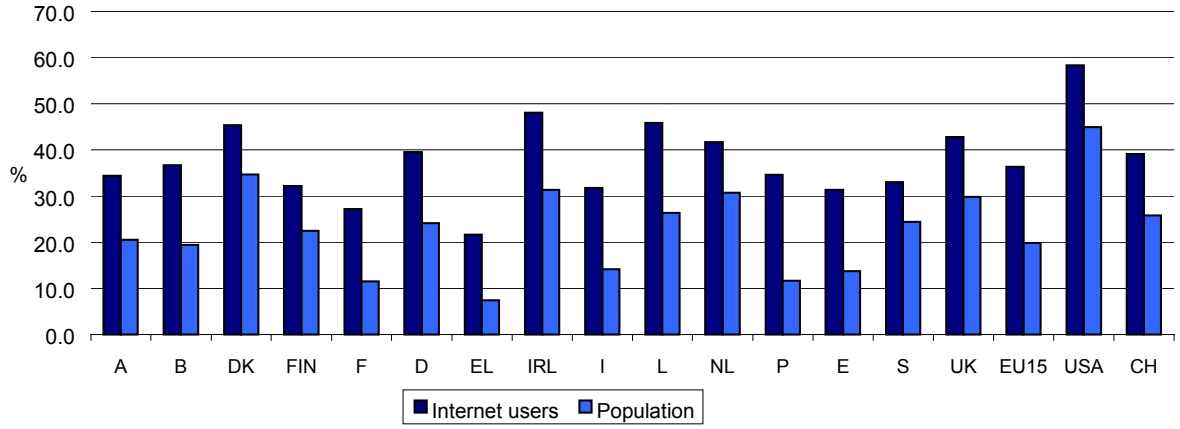
3.3.2.1. Searching for health-related information on the Internet

Amongst those aged 15 years and over who used the Internet in the past year, a little over one third of respondents in the EU (36.4%) reported using it to search for health-related information during the period. This translates into about one in five (19.8%) of the European population aged

[16] The SIBIS indicator testing and data gathering focused on eHealth activity by the general public. Data on eHealth activity by general practitioners (including electronic patient records) from Eurobarometer (Flash EB 104 and Flash EB 126) was presented and discussed in the SIBIS eHealth report (WP5.1, Topic Report 9) and is not considered further here.

15 years and over when non-Internet users are taken into account. Online searching for health information is thus of growing importance within the repertoire of health-related activities of the European public and consequently for public health policy in Europe.

Figure 3.12 Citizens searching for health related information on the Internet
Questions: "..For your private purposes, have you used it [the Internet] in the last 12 months…to search for any health-related information"? Have you done so in the last 4 weeks"?



Bases: "Population": all respondents (N=11,832), weighted; EU-15 weighted by EU-15 population (N=10,306)
"Internet users": all Internet users (N=6,905), weighted; EU-15 weighted by EU-15 population (N=5,828)
Source: SIBIS 2002, GPS

In relation to frequency of usage, in both the EU and US half of those who searched for health-related information did so in the last 4 weeks and half did so in the last year but not the last 4 weeks.

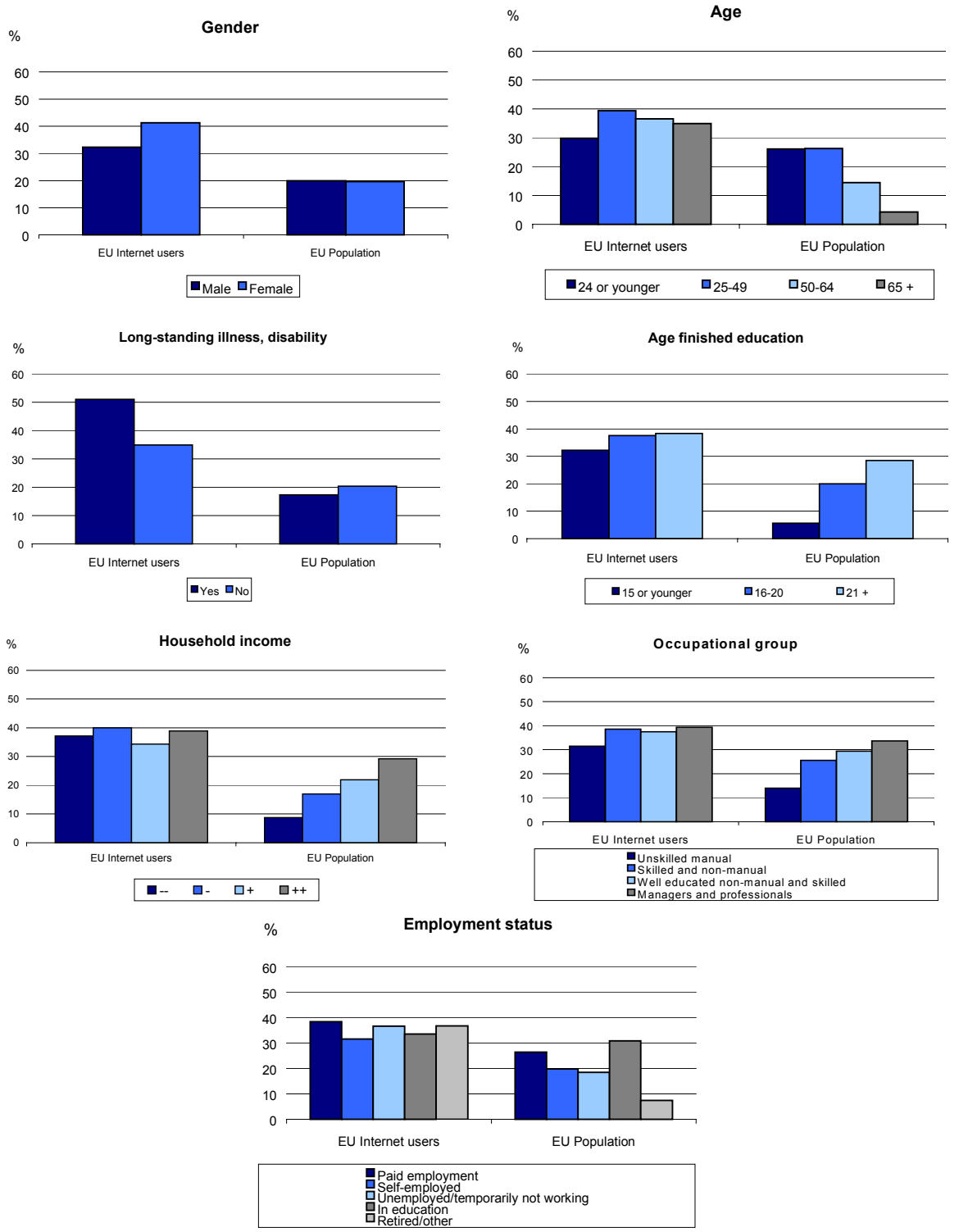
Online searching for health information is more prevalent in the US than in the EU. This form of eHealth activity was reported by more than half (58.3%) of US Internet users, a figure that translates into more that two in five (44.9%) of the US population. Overall, at the population level, this form of eHealth activity is more than twice as prevalent in the US as it is in the EU and the gap remains large even when differential rates of Internet usage are controlled for.

In both Europe and the US, usage of the Internet to search for health-related information appears to be sensitive to location of usage, at least to a certain extent; Internet users who have access to the Internet at home are more likely to search for health-related information than those who do not (40.6% versus 25.4% in the EU and 62.8% versus 41.3% in the US).

Within the EU, the prevalence of online health information seeking varies considerably across the Member States. Amongst Internet users, Ireland had the highest percentage (48.1%) and Greece the lowest percentage (21.6%) reporting any searching for health information in the last 12 months. At the population level, when cross-country differences in prevalence of Internet usage are taken into account, Denmark had the highest percentage of the population (34.7%) reporting searching for health-related information on the Internet in the last 12 months and Greece had the lowest (7.4%).

3.3.2.2. Searching for health-related information on the Internet, segmented socio-demographically

Figure 3.13 Online searching for health-related information by demographic and socio-economic groups (% searching for any health-related information in last 12 months)



Bases: "Population": all respondents (N=11,832), weighted; EU-15 weighted by EU-15 population (N=10,306)
"Internet users": all Internet users (N=6,905), weighted; EU-15 weighted by EU-15 population (N=5,828)
Source: SIBIS 2002, GPS

The Internet and the access that it provides to health-related information may be exacerbating existing socio-demographic "divides" in relation to health matters. Once people have access to the Internet there appear to be relatively few differences across demographic and socio-economic groups in terms of prevalence of seeking health-related information on the Internet. However, differences across groups in relation to Internet access and usage in the first place lead to significant differentials at the population level. If access to more information about health matters is judged to be a good thing, then older people and people in less favourable socio-economic circumstances are currently at a significant disadvantage.

Gender
In relation to gender, female Internet users were more likely (41.3%) to report online health-information searching than were male Internet users (32.3%). At the population level, however, the higher likelihood of Internet usage by males eliminated the gender difference.

Age
In relation to age, younger Internet users (those aged 24 and under) were less likely (29.8%) than other age-groups (35% to 40%) to report this form of eHealth activity. However, differential prevalences of Internet usage across age-groups meant that, at the population level, the highest percentages using the Internet for health-information searching were to be found amongst the younger age group (26.1%) and amongst those in the 25-49 years age-group (26.3%), intermediate levels amongst those aged 50-64 (14.4%) and very low levels amongst the older age-group aged 65 years and above (4.2%).

Health Status
In relation to health status, Internet users who reported having a long-standing illness or disability were more likely (51.0%) to report this form of eHealth activity than those who did not have such a condition (34.9%). Differential prevalence of Internet usage, however, meant that at the population level people without a long-standing illness/disability were a little more likely (20.4%) to use the Internet for this purpose than were those who did have such a condition (17.3%).

Socio-economic factors
Amongst Internet users, there was no clear pattern across socio-economic groups in relation to prevalence of online searching for health-related information. However, when differential prevalences of Internet usage were taken into account, clear gradients were found at the population level in the likelihood of online searching for health-related information; such gradients were found for educational attainment (prevalences ranging from 5.6% to 28.5% as age of finishing formal education increased), household income (ranging from 8.7% to 29.2% with increasing household income) and occupational grouping (ranging from 14.0% amongst unskilled manual to 33.6% amongst managers/ professionals).

Again, amongst Internet users, there were no clear patterns by employment status. At the population level, however, those in the retired/other category had the lowest prevalence of online health-information searching (7.4%), those who were unemployed/temporarily out of work (18.4%) and the self-employed (19.8%) were in an intermediate position and the highest prevalence was amongst those in education (30.8%) and those in paid employment (26.4%).

Finally, amongst Internet users, there were only small differences across household types. At the population level, however, the differentials in Internet usage across household types meant that respondents in households with children were more likely (about 25%) to search for health-related information than were respondents in two-person households without children (18.3%) and single-person households (11.7%)

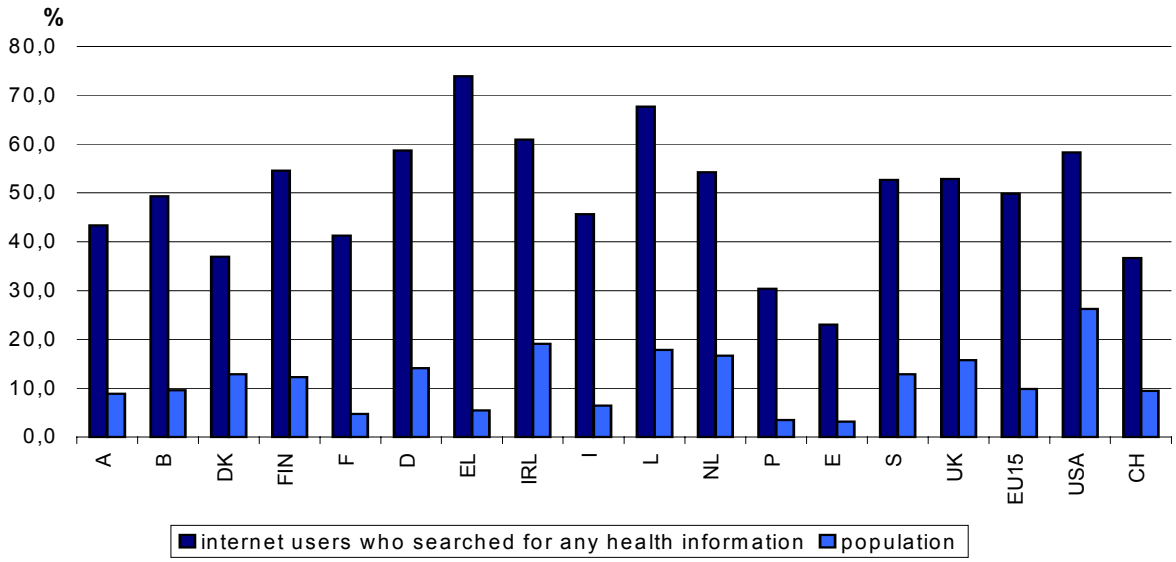
3.3.2.3. Reasons for health-information searching

Amongst Internet users who reported searching for online health-related information, getting better informed on one's general health was the most commonly cited (53.9% in Europe and 71.7% in the US) of the three options given, followed by seeking a second opinion on a medical diagnosis (49.8% in Europe and 58.3% in the US), with fewer citing to support their role as carer of an ill/disabled person (25.0% in Europe and 43.1% in the US) as a reason.

At the population level, when prevalence of Internet usage is taken into account, these figures translate into about one in ten in the EU (10.7%) and one in three in the US (32.2%) searching the Internet to be better informed about their health, just under one in ten in the EU (9.9%) and just over one in four in the US (26.2%) searching the Internet for a second opinion on a medical diagnosis, and just under one in twenty in the EU (4.9%) and almost one in five in the US (19.3%) searching for information to support their role as a carer of an ill or disabled person.

Overall, the figures for health-information searching to get a second opinion on a medical diagnosis are perhaps most interesting. The data shows that this is already being done by a small but significant minority of the general public in the EU as a whole and will pose increasing challenges for policy, both in the regulation of the quality of information on the Internet and in helping healthcare providers and their patients to benefit from the new possibilities for sharing decision-making. The differences across Member States may reflect various factors, such as cultural tendencies towards getting a second opinion and/or in relation to trust in one's doctor, and this is something that warrants further investigation in future studies in the area.

Figure 3.14 e-health usage to seek a second opinion on medical diagnosis
Questions: "And for what reasons did you search health-related information on the Internet? Did you search health-related information on the Internet to…a) seek a second opinion on your own, a family member's, or a friend's medical diagnosis b) be better informed on your general health c) gather information since you care for an ill person or a person with a disability"?



Bases: "Population": all respondents (N=11,832), weighted; EU-15 weighted by EU-15 population (N=10,306)
"Internet users, who searched for any health-related information" (N=2,712), weighted; EU-15 weighted by EU-15 population (N=2,149)
Source: SIBIS 2002, GPS

Within the EU there was a lot of variation across the Member States in relation to prevalence of searching the Internet for the different reasons. For the first reason – to be better informed about one's general health – the prevalence amongst Internet users ranged from more than two thirds in the Netherlands (68.8%) to less than one third in Greece (29.7%). For the second reason – seeking a second opinion on a medical diagnosis – the range was from almost three-quarters in Greece (73.0%) to less than one quarter in Spain (23.2%). Finally, for the third reason – to support role as carer – the range was from almost two fifths in the UK (39.2%) to just over one in twenty in Austria (5.9%).

Younger Internet users (24 or younger) were less likely (37.5%) to report seeking a second medical opinion (possibly because they are less likely to have a specific diagnosed condition) as were those still in education (34.0%); younger people were also least likely (16.5%) to report seeking information to support a role as a carer (possibly because they are less likely to be carers) as were those still in education (16.4%). Those who left school earlier were more likely to report seeking a second medical opinion (78.6%) and to support a role as a carer (43.3%). Finally, those with a long-standing illness/disability were more likely than those who did not have such a condition to report searching for each of the three reasons.

The picture changes at the population level, when differences in Internet usage and in any online searching for health information across socio-demographic groups are taken into account. Overall, younger people tended to be more likely to search for information about their general health and older people aged 65 years and over and those who were retired were a lot less likely to search for each of the three reasons. There were generally clear gradients by educational attainment and

household income for all three reasons. Finally, those in single person households were less likely to search for all three reasons.

3.3.3. Conclusions

The proposed attention given to both the general public and general practitioners in the eEurope 2005 benchmarking is a positive development. However, there are some aspects of both areas that might benefit from some reflection and further consideration.

Firstly, there is a need to ensure that a suitably differentiated picture of eHealth activity by the public is generated. For example, benchmarking could usefully cover searching for information on healthy lifestyles, on particular illnesses, treatments and medications, and for practical information about health services (availability, opening hours and so on), as well as online ordering/purchasing of medication.

Secondly, specific attention could be given to the extent and nature of online interaction between citizens/patients and their own doctor/clinic. This could include the ability to log on to their web site, make an appointment online, have an online consultation about a medical condition, receive test results via e-mail, and request and/or receive prescription renewals via e-mail.

Thirdly, assessment of the types and quality of web sites visited, and of the ability of users to assess that quality is an important area to monitor. This could include the types of web site(s) visited (official health service, professional association, own "traditional" doctor or clinic, other commercial health care provider, pharmaceutical company, online pharmacy, self-help group, etc.), the quality of the sites visited (self-evaluated, whether accredited and/or had quality mark, etc.) and knowledge about quality criteria.

Fourthly, an assessment of the extent and nature of cross-border activity[17] would be timely. This could cover the extent of searching for services in other countries with a view to possibly travelling to avail of such services (by reason for such searching, for example, service not available in own country or has long waiting lists, is of poor quality or of higher cost in own country), and the extent of online consultation with service providers in other countries.

In relation to general practitioner eHealth indicators, a more differentiated view of usage of electronic patient records would prove useful. This could cover what types of record are used (developed by self, provided by health authority, purchased commercially etc.), for what purposes they are used for (internal record management, record exchange, patient access, etc.), and for what proportion of patients are such records being used. It would also be useful to assess the nature and extent of online interaction with patients, including the proportion of patients (if any) with whom electronic interaction takes place and the types of interaction (consultation, test results, prescriptions, etc.) undertaken.

[17] This is potentially an important topic in the context of the internal market for health services

4. A dynamic e-business environment

4.1. e-commerce

4.1.1. EU policy goals and definitions

In 2001 the European Competitiveness Report and Communication on the e-economy outlined how the Commission should work with Member States to support e-business in Europe. The vision was to improve the competitiveness of European enterprises through raising productivity and growth through; investment in information and communication technologies, human resource (through e-skills) and new business models (through e-commerce), and providing a private and secure e-business environment.

To enable this, the eEurope 2005 Action Plan proposes several actions, most notably, a European support network – focussed on strengthening SME adoption of e-business through the promotion of good practice, and standards. The Commission also proposed the fostering and support of public-private partnerships and the co-operation of stakeholders with a view to developing European-wide e-skill definitions. Other actions include the development of interoperability (security between transactions & cross border activities), trust and confidence (dispute resolution) and cyber-identity (authentication etc.). This leads to the collection of five indicators, predominately focussed on the purchasing or selling of products online, but with one indicator which considers internet purchasing for private use.

In formulating the e-commerce *draft* benchmarking indicators, the proposed benchmarking indicators utilises the broad and narrow definition, as defined by the OECD. This essentially states that an electronic/Internet transaction is the sale or purchase of goods or services, whether between businesses, households, individuals, government, and other public or private organisations, conducted over computer mediated networks (broad definition) or Internet (narrow definition). Payment and ultimate delivery may be conducted offline.

With the definition in mind, SIBIS's goal of seeking innovative perspectives developed an indicator similar to G.1, but which highlighted the difference between the major market segments – business, consumers, and the public sector. It also included enterprises of 1 or more employees – essentially micro enterprises, and therefore the data was considered as representing a crucial segment of the economy which is normally omitted from national statistical/Eurostat data.

To support the primary indicator, four statistical indicators have been selected by the eEurope Action Plan, providing further perspectives on the state of play on buying and selling over the Internet. For G2, SIBIS examined a 12 months and 4 week time horizon as to eEurope's proposed 3 month purchasing interval. For G3, SIBIS collected data on this, and like the main policy indicator includes orders received over EDI networks, however, the data is not broken down by size class or NACE activity. The G.4 indicator was not obtained within the SIBIS study, but selected results from the e-Biz Market Watch study[18] are presented. The G.5 indicator was collected within the SIBIS study, but also information on the online sourcing of MRO (Maintenance, Repair and Operations) goods and services was provided. MRO was included as it forms an interesting part of enterprise purchasing, in that it is not strategic (or non-core) and therefore may benefit from the transparency offered by the Internet. It is therefore considered a forerunner to other online procurement activities.

[18] Information and results are available at www.ebusiness-watch.org

Table 4.1 The EC's eEurope 2005 benchmarking indicators and SIBIS's equivalent/supplementary indicators

e-Europe 2005 benchmarking indicators (Status: 30 August 2002)	Equivalent SIBIS indicator
Policy indicator: G.1 Percentage of enterprises' total turnover from e-commerce. **Definition:** e-commerce as defined by OECD including both broad and narrow definition. On-line buying and selling to include both via the Internet and EDI. Sales should include those to business partners (B2B) and private customers (B2C) but only enterprises buying/selling more than 1%online to be included. Except for G.2, tables should be broken down by enterprise size by No. of employees (10-49, 50-249); 250+) and activity (NACE sections D, F, G, H, I, K, 92.1, 92.2) **Source**: Eurostat/NSI enterprise survey **Frequency**: Annual. **Supplementary statistical indicators:** G.2 Percentage of individuals having ordered/bought goods or services for private use over the Internet in the last 3 months G.3 Percentage of enterprises having received orders via Internet G.4 Percentage of enterprises having received on-line payments for Internet sales G.5 Percentage of enterprises having purchased online	**Buying and selling over the Internet**: 1. Share of sales to businesses/consumers conducted online. **Definition**: e-commerce as defined by OECD including both broad and narrow definition. On-line buying and selling to include both via the Internet and EDI. Sales should include those to business partners (B2B) and private customers (B2C). Enterprises buying/selling more than 1% online were included. Sales are broken down across economic categories. Also, average sales are represented. Sales activities are broken down by pub. & social services, fin. & bus. Services, distribution, & manufacturing. **Source:** DMS **Collection Date:** GPS: May 2002 for EU 15, US, & CH DMS: May 2002 for EU7 (D, F, UK, E, FIN, EL) **Other SIBIS indicators:** 2. Percentage of individuals buying on the Internet. Data further segmented by sex, age, low income, & education – DIDIX. (Source GPS) 3. Enterprises having the capability to receive orders over the Internet 4. Percentage of enterprise having purchased online. Further elaborated by MRO activities.

Source: eEurope 2005 & SIBIS.

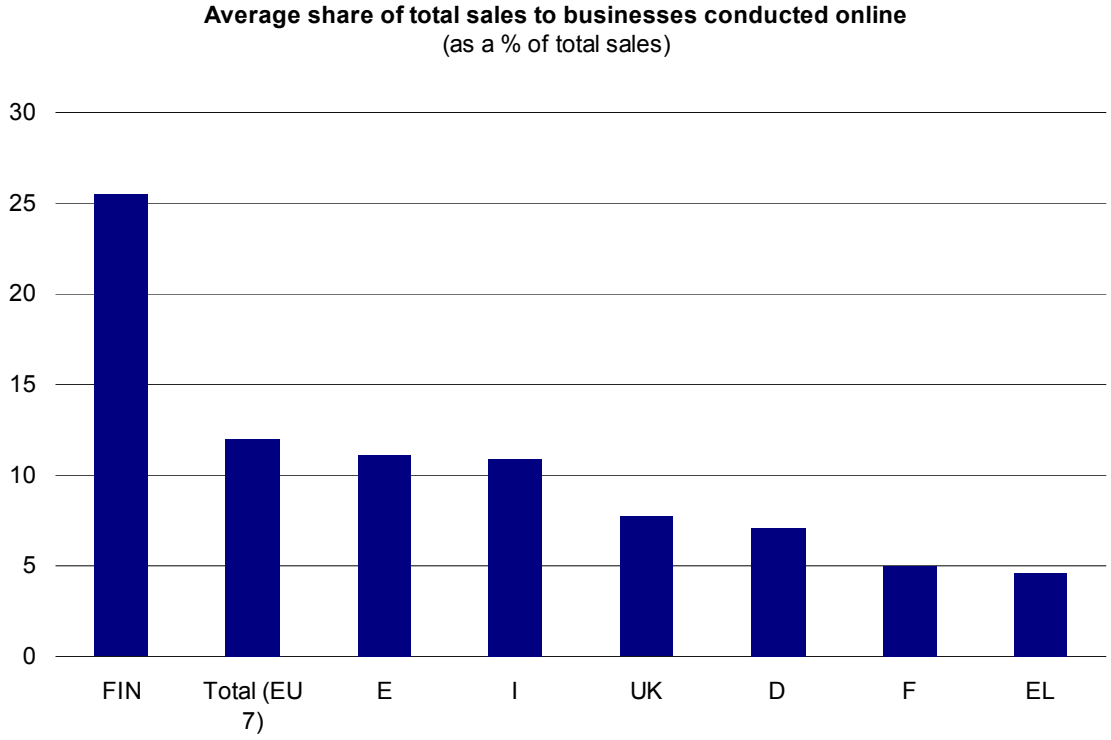
4.1.2. Results from SIBIS

4.1.2.1. Selling over the Internet

On the whole, the results confirm the general perception that the volume of sales generated by e-commerce is small: for half of the establishments involved in it, online sales represented less than 5% of their total sales revenues. Surprisingly, 20% of establishments have online sales varying between 5-25% of total sales, with even 10% of enterprises selling more than a quarter of their sales online.

Examining the business to business sales benchmark, on average, shows reasonable conformity across the middle ground of the EU 7 (Spain, Italy, the UK, & Germany). Finland's position is outstanding, over 2 times the EU 7 average, while Greece closes in on France's position.

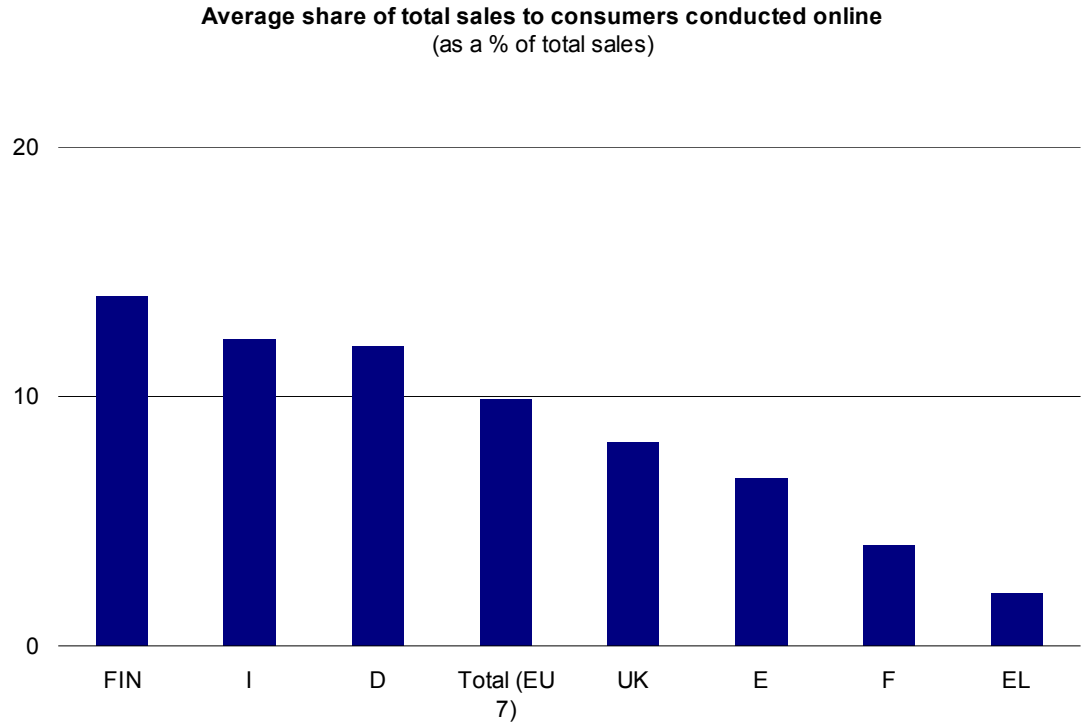
Figure 4.1 Business to Business Sales EU 7 Benchmark
Question: How large a share of your total sales to business are conducted online?



Base: Establishments selling online to businesses (n = 308)
Source: SIBIS 2002, DMS

The performance of sales to consumers shows less a differential between leaders and laggards than with business sales (11.9% compared to 20.9%) with the gap on Finland closing; however, on average the uptake is slightly less (9.9% compared to BtoB's 12%). As in online business to business sales, Finland takes the clear lead, with Italy, Germany, and the UK forming the middle ground. Spain leads those playing catch-up, which again includes France and Greece.

Figure 4.2 Business to Consumer Sales EU 7 Benchmark
Question: How large a share of your total sales to consumers are conducted online?



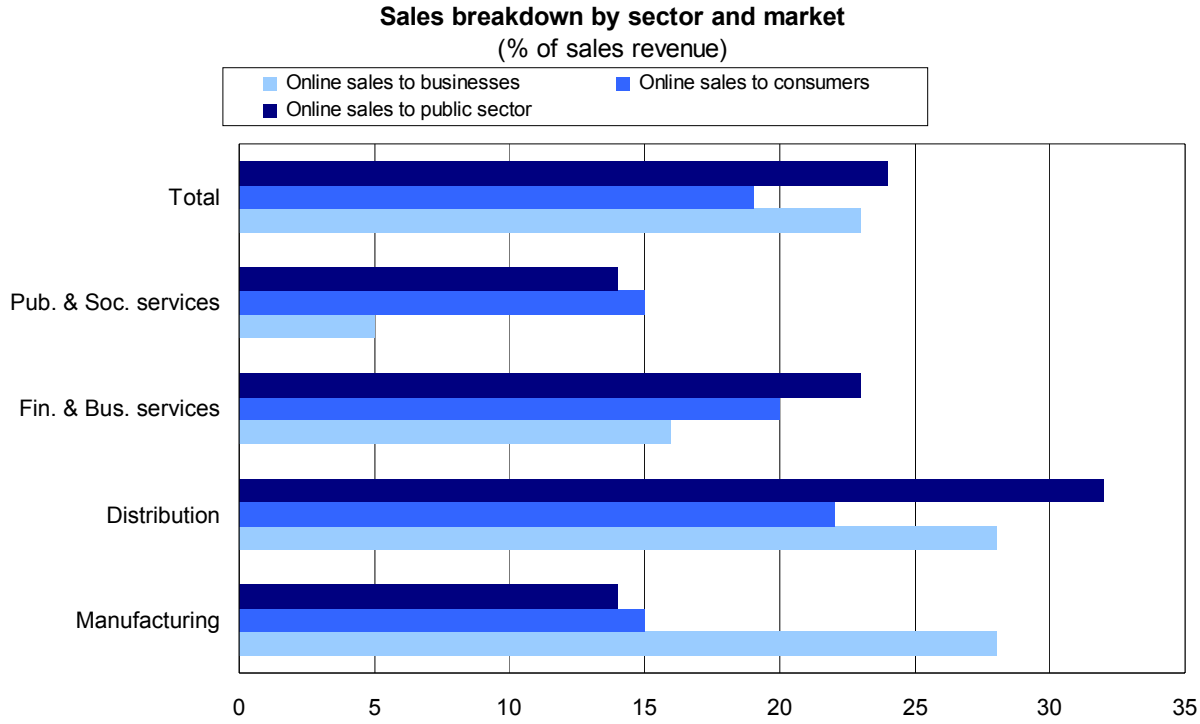
Base: Establishments selling online to consumers (n = 327)
Source: SIBIS 2002, DMS

Utilising the results of the e-Biz W@tch survey, it is possible to analyse average sales across the EU 15 – albeit limited to 15 economic sectors. Overall the performance differential of 12.5% (between leader and laggard) mirrors that of the previous chart, the consumer sales performance. The middle ground consists three of Europe's big four economies, with the UK playing catch up on Finland. Clear leaders of the pack are the Netherlands and Ireland; with Luxembourg, Greece, and Spain following at the rear.

As well as ascertaining business, consumer and the average amount of enterprises sales from e-commerce, SIBIS identified sales by economic activity - a four level classification comprising: public and social services; financial and business services; distribution; and, manufacturing. This provided a useful overview for differentiating online sales activity (differing slightly from the eEurope 2002 indicator – replacing construction with public and social services).

Examining establishments whose online sales are between 5 and 25%, which is certainly the most interesting sales bracket, shows distribution as the clear leader, followed unsurprisingly by financial and business services, closely followed by manufacturing. Public services follow someway behind the pack. Examining more closely the allocation of sales, distribution fairs well with sales to the public and businesses. The manufacturing sector sells clearly more to businesses, while distribution and financial *et al* sell more to consumers. The public sector obviously interacts with the public and other public sector organisations, but much less than the other sectors. This illustrates that the public sector still has someway to go, and is still playing catching up to other sectors, with implication for the eEurope 2005 action plan goals in this area.

Figure 4.3 Breakdown of establishments with online sales between 5% and 25% of revenues by macro sector and customer target (% of respondents)
Questions: How large a share of your sales to businesses/consumers/public sector is conducted online?



Base: Establishments selling online to businesses (n = 308); Establishments selling online to consumers (n. = 327); Establishments selling online to the public sector (n. = 157); weighted according to employment
Source: SIBIS 2002, DMS

A more articulated segmentation by sector and target market would probably discover even stronger variations, which general averages in the macro sectors may flatten out. Therefore, undertaking NACE breakdown may prove useful in understanding the uptake/relevance of e-commerce to specific sectors of the economy.

In terms of being a feasible indicator, a significant issue was uncovered within SIBIS's enterprise study. This study revealed that a fifth (20%) of respondents did not know their amount of online sales. This could initially be interpreted as online sales in those businesses represented an insignificant amount, however, it may be that the Internet provided an initial contact, or the transaction was completed offline. Therefore it appears that attributing the source of the sale may be difficult for some businesses to determine. This could easily be added to the *don't know* category, however, this represents too large a proportion to be excluded. Possible ways around this may be interviewing the commercial or sales directors, as well as the IT manager. Similarly, it may be interesting to disaggregate sales classified as e-commerce into whether the Internet provided an initial contact, enabled complete online negotiation and/or transaction, or whether payment was conducted offline.

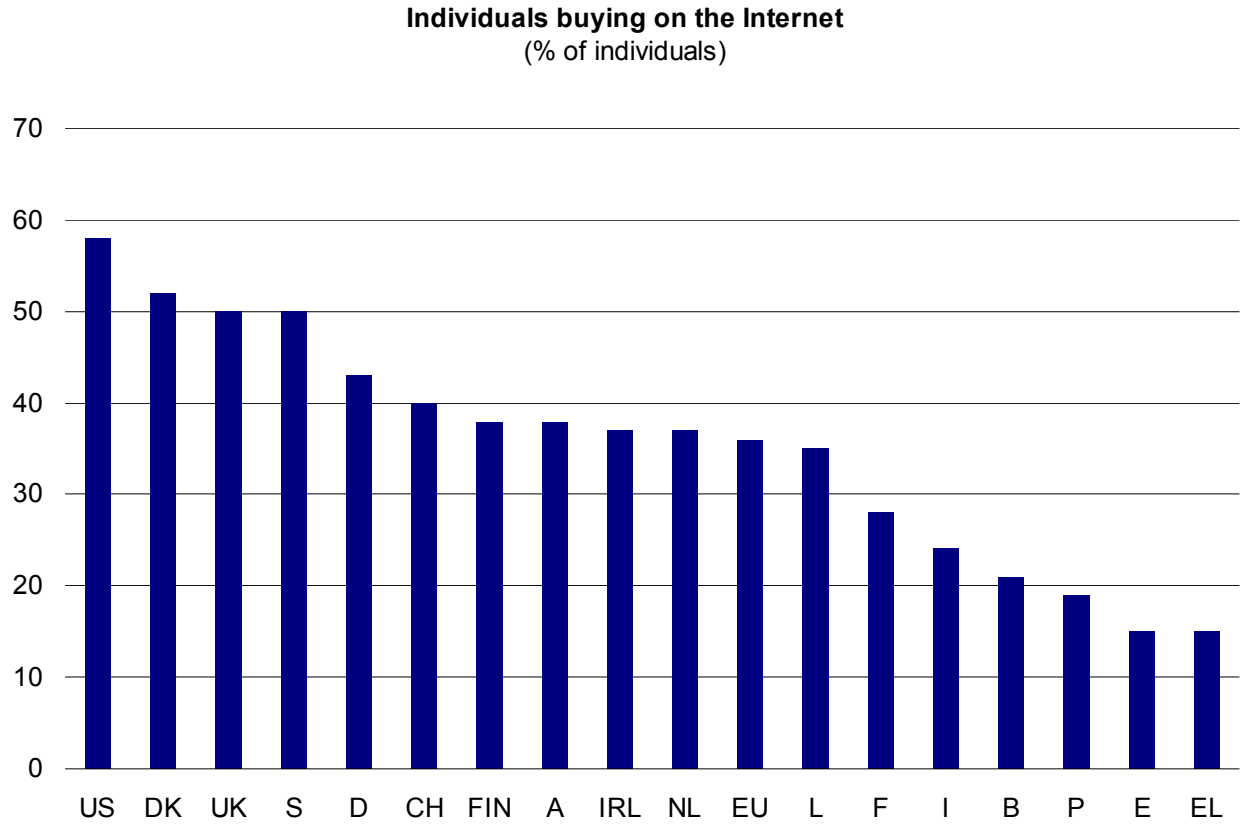
4.1.2.2. Individual Consumer Behaviour

Individuals' consumer behaviour is a crucial technological pull factor for increased investment in ICT technologies (for those sectors and selling to the public). Ascertaining purchasing behaviour revealed that in Europe approximately a third of Internet users order products or services online.

SIBIS's general population survey also estimated that online buyers represent 36% of EU respondents having accessed the Internet at least once in the last 12 months, which is approximately 76 million people. This is consistent with data provided by the Eurobarometer survey, which in November 2001 estimated online buyers represented some 35% of Internet users in the EU.

Benchmarking consumer e-commerce behaviour not only enables a clearer distinction between the most developed BtoC economies and those where it is marginal, as illustrated in figure 4.6, but also provides a meaningful perspective on "the middle ground". This can be seen clearly in e-commerce behaviour as it is segmented within a tripartite. The clear leader within the upper partite is the US (leading the EU average by a factor 0.6 and by 1.2 for those at the tail end), followed by Denmark, Sweden, the UK and Germany. Within the middle, Switzerland leads the pack, with Luxembourg slightly behind the EU average. The lower partite consists France, Italy, Belgium, Portugal and Greece.

Figure 4.4 Individuals buying on the Internet
Question: In the last 12 months have you used the Internet , for private purposes, to order a product or service?



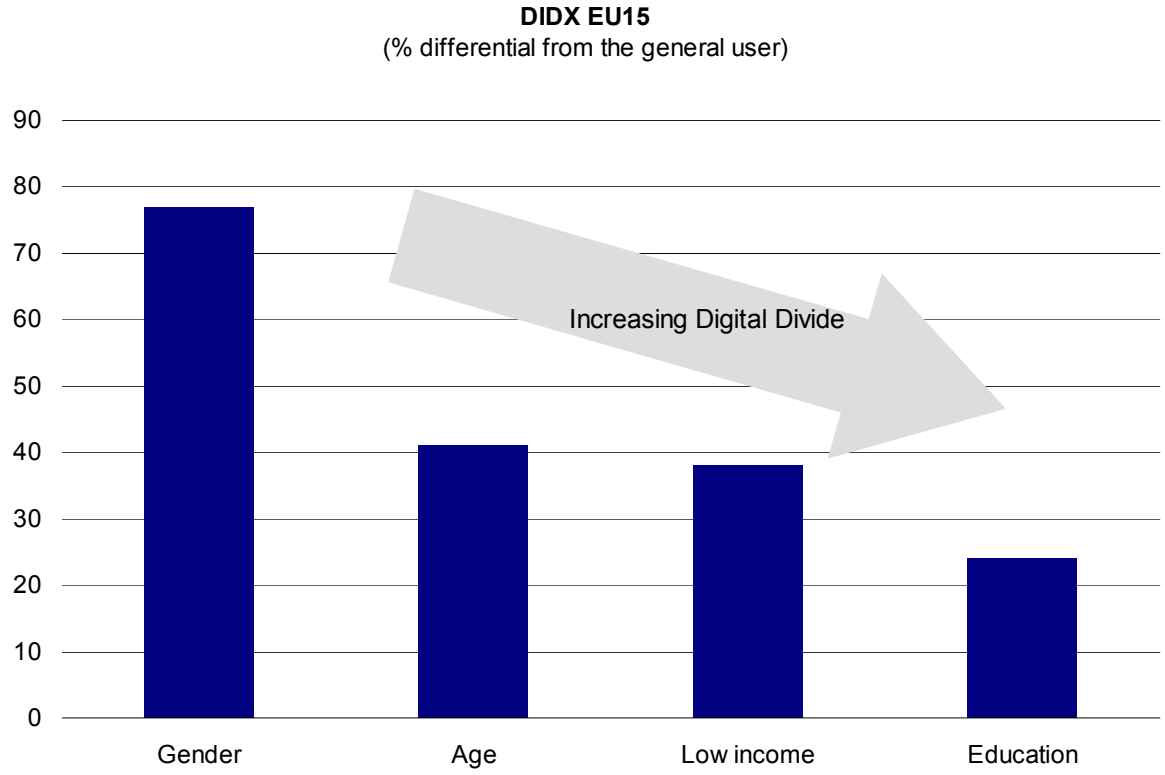
Base: all Internet users, weighted - EU 15 weighted by EU population
Source: SIBIS 2002, GPS

As for the reliability of online purchasing indicators, SIBIS's experience was mixed. The 12 month purchasing interval proved more reliable than the week 4 interval, which provided inconsistent survey results. Assessing consumer behaviour over a 3 month period may prove more reliable than the 4 week period used within SIBIS, however, it is felt that as the market is still relatively underdeveloped and so a 12 month purchasing time period should supplement the 3 month interval as suggested by the draft eEurope benchmark.

4.1.2.3. Individual Consumer Behaviour and Socio Economic Divides

SIBIS observed that key socio-demographic characteristics differentiate the e-commerce buyer from the average Internet user, known as the "digital divide". Examining the most salient features of socio-economic and demographic profiles of e-commerce buyers (i.e. people ordering online), of online interactive users (individuals who have engaged in searching information on products and services, and conducting online banking in the last 12 months) and of average PC users, revealed a closing gender gap; but notable age, income and education gap. The charts illustrate, in percentages, the deviation of demographic and socio-economic profiles from the "average user". For example, the gender balance shows that in Europe buyers are more likely to be male than female, with 23% more males buying online (SIBIS predicts this gap to close, since many surveys, other than SIBIS, show a lively interest from the female population).

Figure 4.5 Digital Index Divide (DIDX) according to gender, age, income and education status
Data elaborated from Internet users who have purchased a good or service over the Internet in the last 12 months



Base: all Internet users, weighted - EU 15 weighted by EU population
Source: SIBIS 2002, GPS

Age (over 50 years) and education (leaving full-time education below 16) are also significant factors in determining ones propensity to buy online. However, the extent to which demographic-economic exclusion determines online buying activity is difficult to determine. Access to the Internet at work and the type of goods and services currently being sourced online are currently youth orientated with a potential bias towards consumables (DVDs/CDs/books/etc.).

In terms of education, a comparison between user groups confirms that a higher level of education is significantly correlated with a propensity to be an interactive user or a buyer. A worrying trend is that, when compared to 1997 data, the gap between those with higher/tertiary education has widened slightly. This is possibly linked with a greater exposure of undertaking online activities/transactions at work, and/or the self-confidence to deal with security and privacy-related fears. Also, buyers display a slightly more interactive use on the PC than the general user. Since e-commerce is in its early phase of development in Europe, this could mean that buyers are still more sophisticated and pioneer than general Internet users.

4.1.2.4. Country differences

As the data was obtained within SIBIS's general population survey, it was possible to observe deviations across the EU's member states, the US, and Switzerland. As far as a closing gender gap is concerned, the US leads the way, but a significant number of EU countries are not far behind (US show 6% differential compared to the EU's 23% differential across the sexes), with Austria, the UK, and Nordic countries leading the way.

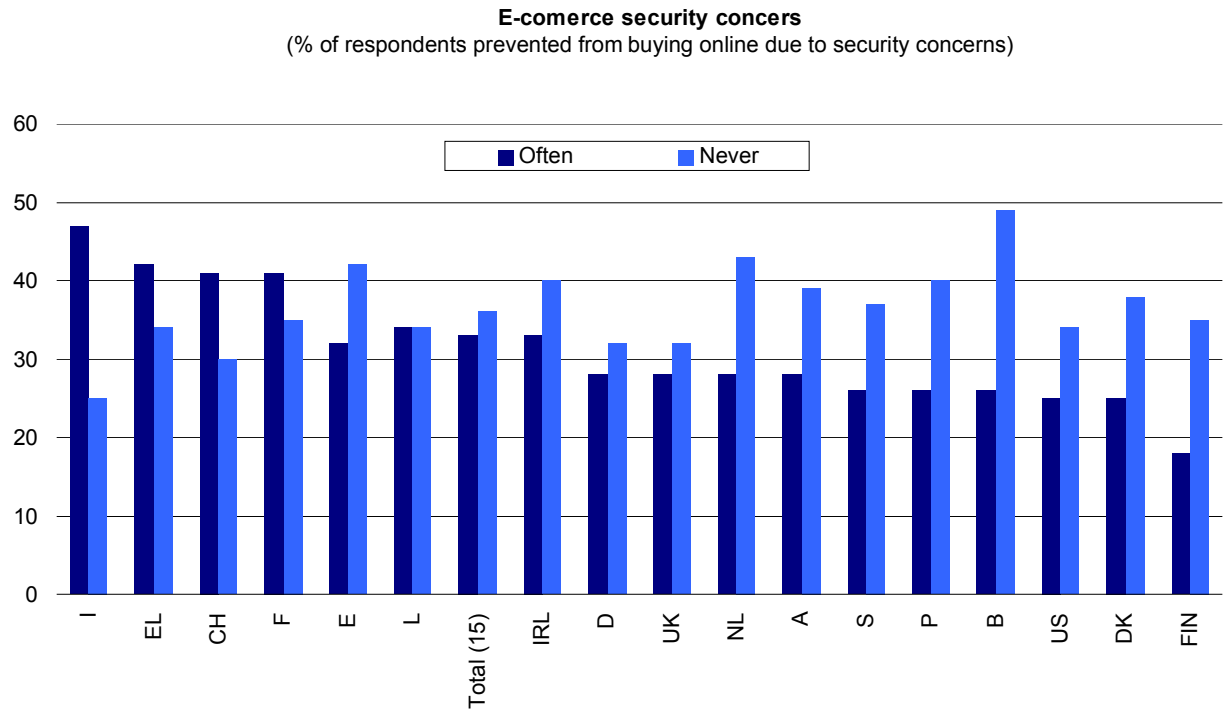
Age, the second largest differential between online buyers has a similar spread to sex (approximately 50% between those countries with less/greatest differential). Forrester et al (2001) research identified that Age held the widest gap in the digital divide, although they did not sample education. What is interesting though is that there is little consistency across countries, between sex, age, income and education. Whilst the US maintains it premiere position for sex and age, it loses it for income and education. Also, for sex and age, the average EU15 position is evenly positioned, illustrating a balanced spread between member states. The situation changes for low income and education, illustrating that within a few member states these socio-economic differentials are closing more rapidly, especially in Sweden, Austria, Finland.

As mentioned earlier, education provides the greatest demarcation between those who buy online and those who do not. Switzerland has the smallest gap, at 46%, with the EU's position being some 75%, and Belgium has a significant 94% differential across the education divide. Interestingly, there is not a north south partition when it comes to this socio-demographic divide. There are obviously compounding factors for those finishing education early. They are less likely to be white collar workers (and therefore may have less exposure to Internet connected PCs at work), and perhaps may perceive a lack of skill to navigate the Internet, when compared to those who have had higher or tertiary education.

4.1.2.5. Security concerns

Whilst not covered in the eEurope 2005 indicators, SIBIS did review on of its proposed actions, which is the goal of increasing trust and confidence. SIBIS found that one in three Europeans report that security concerns often stop them from buying goods or services online. This is higher than the one in four in the US, although users in some EU countries are indifferent to security concerns when compared to their US counterparts, with the Danes and Finns taking the lead. However, being stopped by security concerns is not the only factor involved. Some countries (such as Belgium) have low levels of e-commerce despite also having low levels of being put off by security concerns.

Figure 4.6 Effects of Security Concerns on e-commerce behaviour by country (% of respondents stopped from online shopping)
Question: Are security concerns preventing you from buying online?



Base: respondents who are very or somewhat concerned about security concerns on web sites (N = 4936), weighted. Eu15-results weighted by EU15-population (N=4117).
Source: SIBIS 2002, GPS

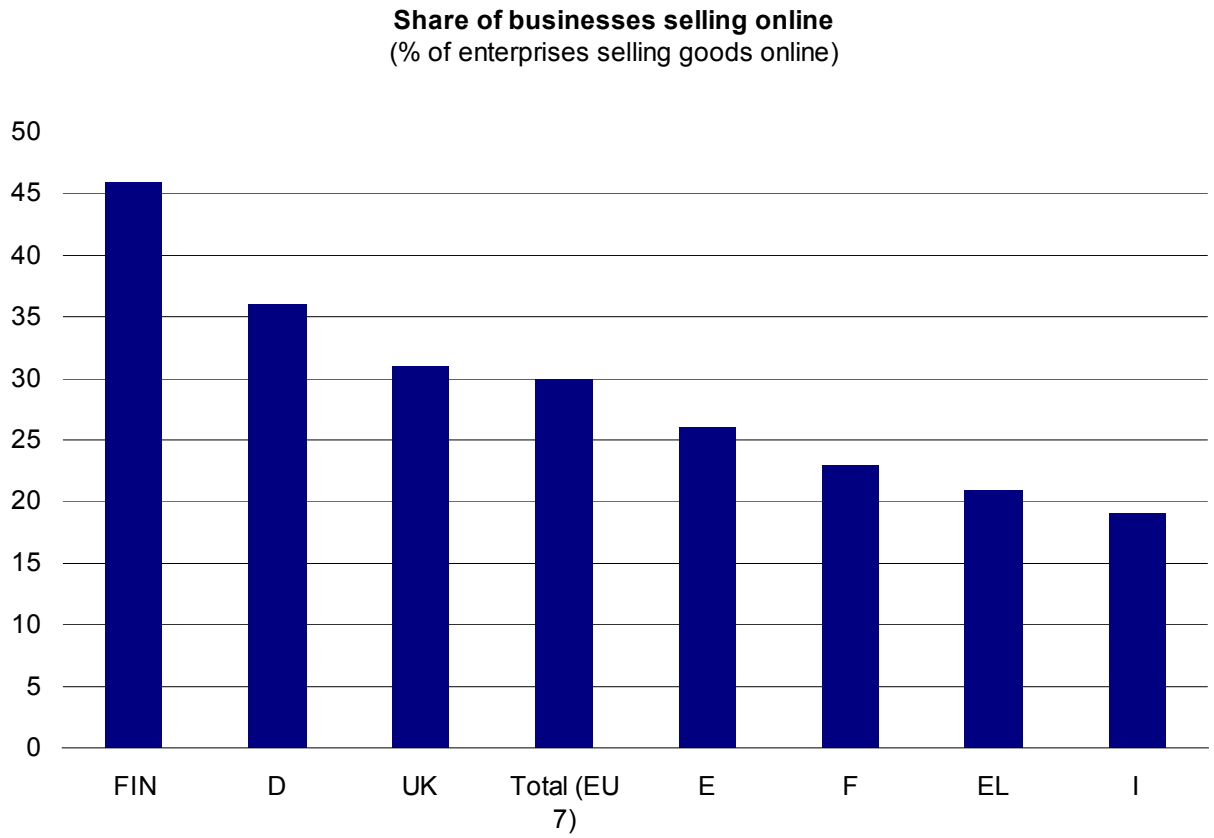
The conclusion is that security concerns are probably a relevant barrier against e-commerce for a specific segment of the public, and more so in certain countries, rather than a universal problem. SIBIS elaborations point out that these "over-cautious" users cannot be identified by age, sex or professional status (even if younger users do tend to be less worried).

4.1.2.6. Enterprises selling goods or services via the Internet

The previous indicators (selling over the Internet) reviewed the average share of goods sold to customers online. An interesting compliment to this is to observe is the ability to receive orders online. Unfortunately, this was not covered in SIBIS, but the activity of online sales and reservations was. This is interesting in that it shows the actual number of those trading, or with the potential to trade online. This therefore includes enterprises where, at present, a fraction of trading may be undertaken via the online route.

According to the SIBIS results, Finnish companies are championing the cause, being almost twice as likely to be trading online as Italian and Greek enterprises. The UK and Spain take the middle ground with between a third and a quarter of enterprises being able to trade online.

Figure 4.7 Enterprises selling goods or services via the Internet
Question: Do you sell goods or services via the Internet?



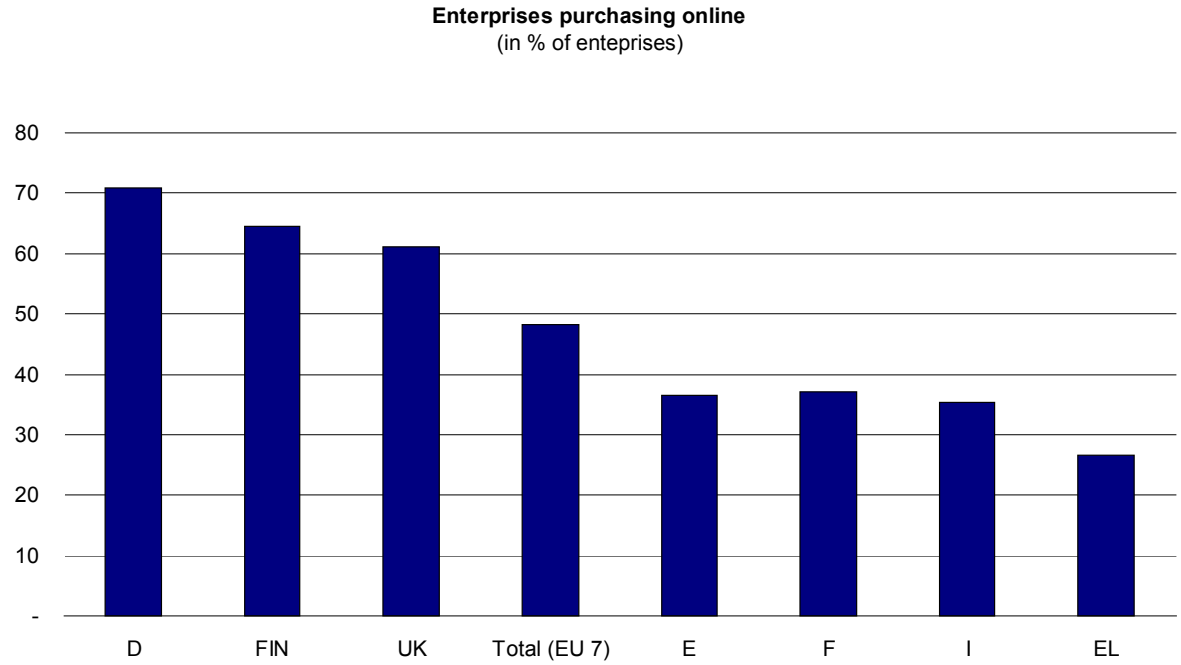
Base: establishments selling goods or services through the Internet, weighted by employment (n=1,949).
Source: SIBIS 2002, DMS

4.1.2.7. Percentage of enterprises having purchased online

A significant proportion, in fact over three fifths (60%), of enterprises in Germany, Finland, and the UK, purchase over the Internet. According to the e-Business Market Watch survey, as well as the Eurostat 2001 survey, the propensity to buy online is diffused across size classes; with enterprises generally demonstrating a much higher propensity to acquire than to sell online. Enterprises are more likely to experiment with online purchases, especially for MRO (maintenance, repair and operation goods and services, such as office supplies) which are not strategic to their core business. Within these services cost reduction is a main motivation for purchasing online, by finding the most efficient suppliers, improving the management of inventories and reducing time for goods delivery.

In terms of progression over the last 2 years, Germany, the UK and to lesser extent Spain, France and Italy have made good progress. According to the DTI's IBS (2001) study, Germany has the largest growth rate (30% over 2 years), with Italy, the UK, and France following equally behind (at 18%, 17%, and 15% respectively).

Figure 4.8 Share of enterprises buying online benchmark
Question: Do you use the Internet or other online services to purchase goods or services?

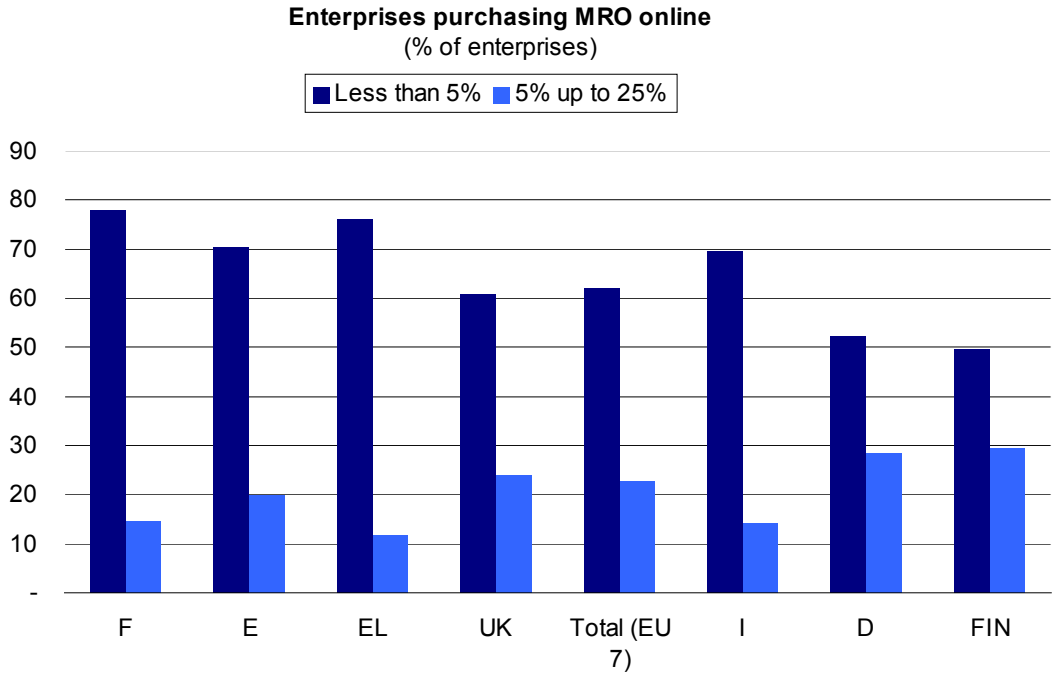


Base: all establishments with access to the Internet (n = 2,785); weighted by employment
Source: SIBIS 2002, DMS

Similarly to e-sales, e-procurement is still confined to low volumes. Analysing SIBIS and eBusiness Watch survey results revealed closing gaps between countries and economic activity, with almost convergence across all sectors, with the exception of telecommunications and computer services. The average value of MRO was in the main confined to less than 5% of all purchases. Within the EU7 sample, an average 62% of enterprises procuring online did so for less than 5% of their total MRO value - with minor variations by country. More significant procurement of MRO goods are undertaken by Finland, Germany and the UK.

Figure 4.9 Share of enterprises purchasing MRO online by value benchmark (% of enterprises): ranked by the <5% trading category

Question: What proportion of maintenance, repair, and organisation goods your establishment buys are purchased online, measured in amount spent?



Base: all establishments procuring MRO online (n = 1,346) ; weighted by employment
Source: SIBIS 2002, DMS

4.2. e-Business readiness

4.2.1. EU policy goals and definitions

The EC is working in co-operation with Member States to support e-business in Europe. The goal of the eEurope Action Plan is to promote take up of e-business with the aim of increasing the growth through investment in information and communication technologies, human resources and new business models. This is a relatively broad area of business activity, and whilst the proposed indicators suggest a number of areas which are of particular interest, even these do not detail particular applications. Through the results of e-Business Market Watch[19] it was possible to focus in on specific activities and applications which are known to be part of more interconnected and interoperable e-business activities.

The promotion of flexible work environments favourable for e-business readiness is seen as an important prerequisite to e-business uptake. SIBIS has addressed the issue of flexible working in a broader sense and not restricted itself to directly ICT-based ways of working. However, the focus of work was on the topics of "telework" and "tele-cooperation" which have been identified as areas in which existing indicators are not adequately representing the nature of ICT-enabled changes to working locations. These SIBIS indicators and data were combined with other ones from existing secondary sources, which can help in developing a measurement for the flexibility in and adaptability of work and work arrangements in the European economies. This measurement, the AWAI (Adaptability of Work Arrangements Index) consists of two elements: one sub-index measuring worker-centred flexibility and another one measuring company-centred flexibility.

Table 4.2 The EC's eEurope 2005 benchmarking indicators and SIBIS's equivalent/supplementary indicators

e-Europe 2005 benchmarking indicators	SIBIS indicator
Policy Indicator: H.1 e-business index (composite indicator) **Definition**: A mathematical function (to be defined in 2003) combining a number of key internal and external business processes, which enterprises in Member States conduct using integrated digital means **Source**: Eurostat/NSI enterprise survey **Frequency**: Multi-annual **Supplementary indicators:** H.2 e-readiness regarding production and delivery of products and services: Internal process: Is the ICT system for planning and management of production of delivery integrated with other ICT systems in the enterprise? External process: Is the ICT system for planning and management of production or delivery integrated with ICT system of the enterprise's partners (customers, suppliers etc.)? H.3 e-readiness regarding marketing, sale and customer service Internal process: Is the sales system integrated with planning- and accounting systems in the enterprise?	**Policy Indicator**: 1. e-business index (composite indicator) not computed **Other SIBIS indicators:** 2. e-business information exchanges: Percentage of enterprises whose ICT systems exchange documents between other enterprises. Indicator includes online management of capacity/product demands/interaction with customers. This produces a perspective on the type of online activity enterprises are engaged in: featuring production and delivery (source e-Business Market Watch). 3. e-market readiness: Percentage of enterprise utilising e-SCM and e-CRM, presented with the % of enterprises implementing knowledge management practices (KM). The results are presented for 15 economic sectors (source e-Business Market Watch). **Source:** e-Business Market Watch **Collection date:** 4. Promoting a flexible work environment favourable for e-business readiness: SIBIS AWAI index. This indicator has no equivalent in SIBIS/e-Business

[19] Information and results are available at www.ebusiness-watch.org

	External process: Can customers access product information and other marketing material from a website, which is integrated with the enterprise's internal ICT systems?	Market Watch **Source:**
H.4	e-readiness regarding management of financial resources and relations: Internal process: Does the enterprise use applications (e.g. accounting systems) for budgeting, allocation of resources and, which are integrated with other ICT systems in the enterprise? External process: Does the enterprise conduct financial transactions on-line?	GPS: 2002 for EU 15 DMS: 2002 for (D, F, UK, E, FIN, EL) ECATT Eurostat OECD ESWC CVTS **Collection date** From 1999 to 2002

Source: eEurope 2005 & SIBIS

4.2.2. Results from SIBIS

Producing supplementary indicators, which support the main policy indicator (a composite e-business index), that capture the variety and complexity of: production and delivery activities; marketing, sales and customer services; and the management of financial resources is particularly difficult issue.

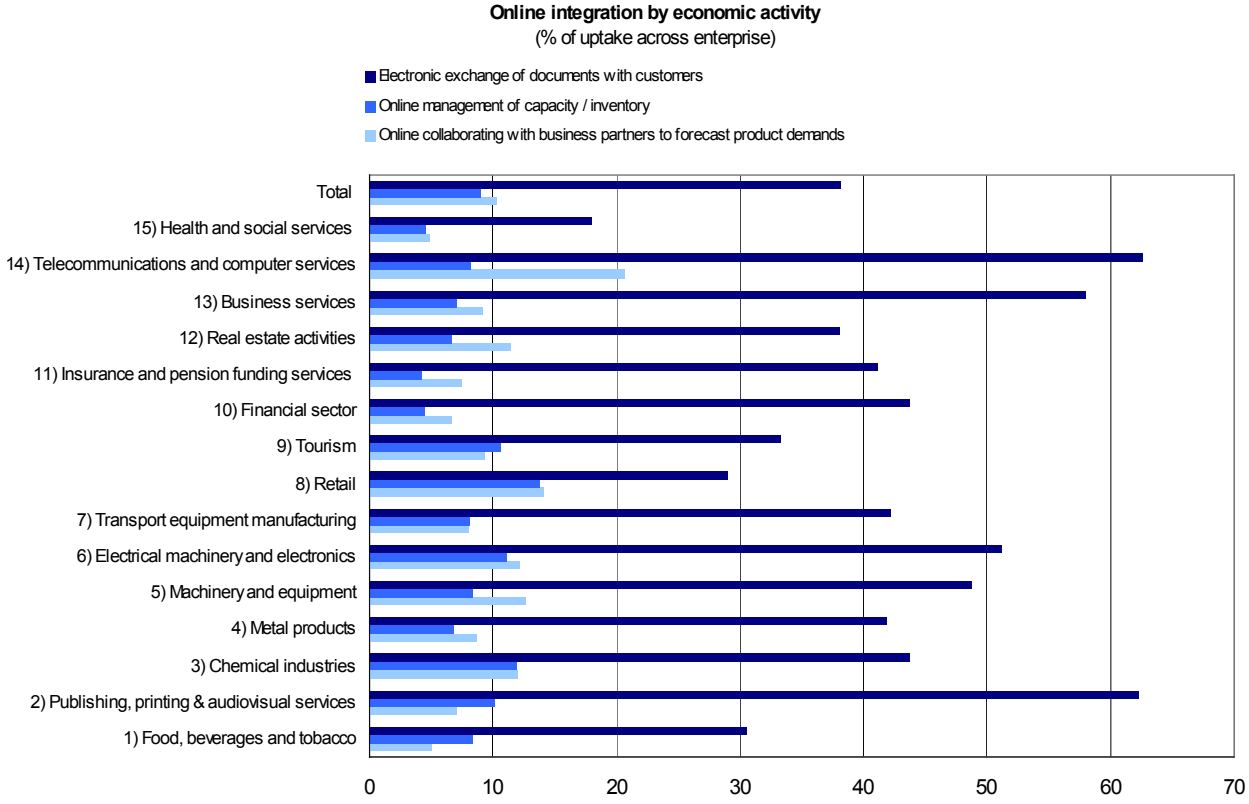
Whilst the supplementary indicators were not collated in the SIBIS project, a number of similar ones were from the e-Business Market Watch survey. As H2 focuses on the production and deliver of products or services, it is feasible to use the electronic exchange and capacity/inventory between enterprises and customers as a benchmark. Also, as H3 concerns marketing, sales and customer service, the indicators use e-Customer Relationship Management (e-CRM), e-Supply Chain Management (e-SCM) and knowledge management are brought together to illustrate ICT systems used which focus on customers and suppliers.

4.2.2.1. Percentage of enterprises whose ICT systems exchange documents between other enterprises

The ability to negotiate, plan and manage the production and delivery of goods through an integrated ICT system has the potential for the enterprise to be connected in a virtual chain of supply, production and delivery. Potentially reducing transaction costs, and increasing the speed of delivery enables significant commercial advantage. The e-Business Market Watch study revealed that the online management of capacity and inventories and the negotiation of contracts has between 7% and 27% uptake across the economic activities. These appear to be very limited applications, illustrating that enterprises have a long way to go before more complex interaction/negotiation can be undertaken electronically.

Figure 4.10 Online management of capacity/inventory, production forecasting, and the exchanging of documents with customers

Does your enterprise: exchaNge electronically documents with customers, use online management to control capacity/inventory, use online collaboration to forecast product demands?

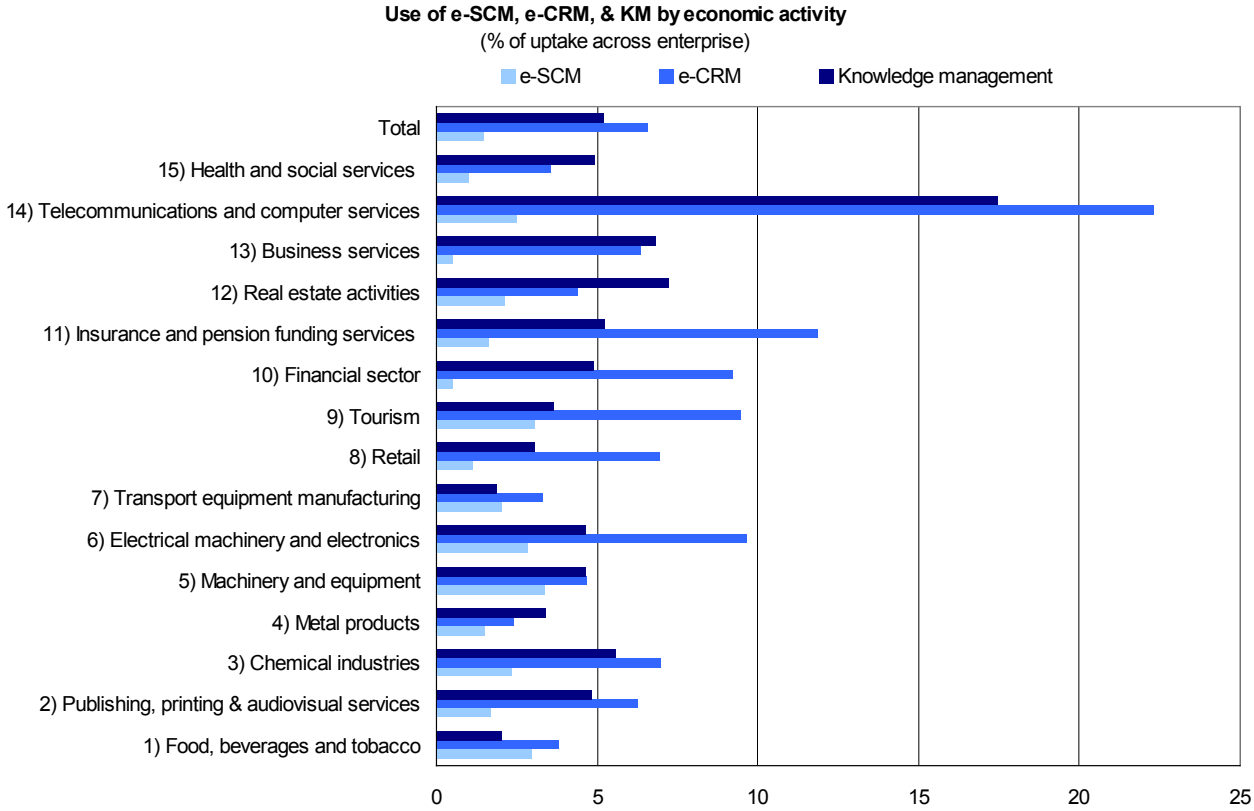


Computational base: all enterprises (EU4, employment weighted)
Source: e-Business Watch (2002)

The sharing of documents and the undertaking of collaborative work is hugely improved through ICTs. Comparing sectoral progress reveals that telecommunications, electrical machinery and transport equipment manufacturing are particularly advanced when compared to retail, tourism and even real estate activities. Security fears, the value added of such activities, and the compatibility of differing systems still poses significant barriers. This is a significant action area for eEurope 2005, and therefore results would suggest further research in the application of standards across the economic landscape.

4.2.2.2. Percentage of enterprises utilising e-SCM & e-CRM

Figure 4.11 Usage of e-CRM and e-SCM solutions
Does your enterprise use: e-SCM, e-CRM, Knowledge management?



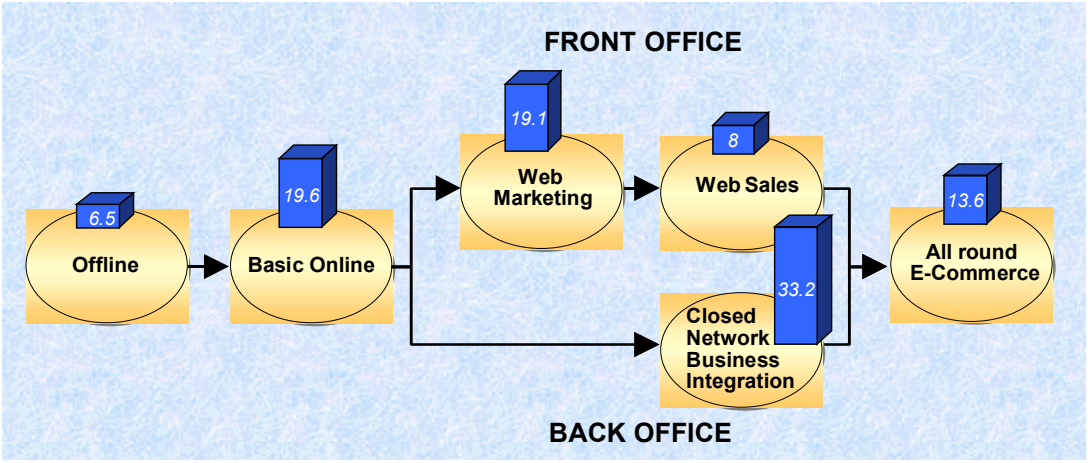
Computational base: all enterprises (EU4, employment weighted)
Source: e-Business Watch (2002)

The use of e-CRM and e-SCM are often seen as the cornerstone of an e-business strategy. In comparison to the uptake of other applications, e-CRM and e-SCM are particularly less developed. Interestingly though, a few sectors are championing the cause, such as financial services for e-CRM, whereas machinery and equipment (transport and electrical) embrace e-SCM. Unsurprisingly the split between the two applications are between manufacturing and services. Knowledge management shows a similar split, with a bias towards the service industries – again though telecommunications is the anomaly in significantly championing the cause.

4.2.2.3. Degree of business engagement in e-commerce

To supplement these single application indicators, SIBIS developed a new typology of e-commerce indicator which provides the levels of activity and integration of business processes. It clearly shows that European businesses vary widely in their levels of engagement with e-commerce. Whilst few are offline, and a quarter participate in basic online activities, with the majority participating in closed business network integration. Web marketing, and to a lesser extent web sales are also important functions. All round e-commerce participants are just less than a fifth of EU enterprises – biased towards larger enterprises.

Figure 4.12 Degree of business engagement in e-commerce. Activity in % of all enterprises



Base: all establishments (N=3,139); weighted by employment; EU7 additionally weighted by employment per country
Source: SIBIS 2002, DMS – empirica calculations

4.2.2.4. Adaptability of Work Arrangements (AWAI) Indicators

The AWAI compares the progress that individual EU Member States have made with regard to the diffusion of flexibility on labour markets. It is constructed using the indicators showed in Table 4.3. Data is derived from officially available statistics: the OECD; the Labour Force Survey; and Eurobarometer; as well as the SIBIS General Population Survey.

Table 4.3 Indicators for Measuring Adaptability of Work Arrangements (AWAI)

Dimension	**Indicator (source)**	
	Worker-centred flexibility	***Company-centred flexibility***
Time	Voluntary part-time working (LFS)	Part-time working (LFS)
Time	Temporal autonomy in job (SIBIS)	Workers with atypical working times (evening, night, weekend work and working long hours) (ESWCs)
Place	Home-based teleworking (excluding self-employed) (SIBIS)	Tele-cooperation (SIBIS)
Place	Telework feasibility (SIBIS)	Mobile teleworking (SIBIS)
Contract	Self-reported job security (SIBIS)	Employment Protection Legislation Indicator (OECD)
Contract	Average job tenure (OECD/LFS)	Workers with temporary work contracts (excluding voluntary and contracts for training) (LFS)
Content	Participating in work-related training (lifelong learning) (SIBIS)	Enterprises offering training (CVTS)
Content	Participation in decision-making concerning changes at workplace (ESWCs)	Management by objectives (ESWCs)

Notes: LFS = Community Labour Force Survey (latest available 2001); ESWCs = European Survey on Working Conditions (1990; 1995; 2000); CVTS = Continuing Vocational Training Survey (2000); OECD: see Nicoletti, G., Scarpetta, S. and Boylaud, O. (2000) 'Summary Indicators of Product Market Regulation with an Extension to Employment Protection Legislation', OECD Working Paper
Source: SIBIS 2002

Comparing the results for both sub-indices shows that there are marked differences between both rankings, with some countries performing well in one sub-index and below-average in the other.

The following table ranks countries according to their mean ranking in the eight variables representing worker-centred flexibility. The Netherlands, the benchmark for five out of the eight indicators, come out first, followed by the Nordic countries Sweden, Finland and Denmark. Spain and Portugal clearly lag behind.

Table 4.4 AWAI values – Sub-index on worker-centred flexibility

Dimension	TIME		PLACE		CONTRACT		CONTENT			
Indicator	Voluntary part-time working	Discretion over working time	Home-based teleworking	Job feasibility for telework	Perceived job security	Job tenure	Participation in decision making	Lifelong learning	AWAI Worker-centred Flexibility Index[20]	Country rank
Netherlands	100	89	100	100	100	72	100	78	11.38	1
Sweden	44	100	72	79	98	86	88	79	10.88	2
Finland	20	94	76	94	81	76	97	100	10.00	3
Denmark	47	78	86	71	93	64	98	75	8.88	4
Germany	43	92	38	92	72	77	75	97	8.63	5
Belgium	41	80	36	82	77	88	81	55	8.13	6
Austria	38	72	33	81	90	80	76	90	8.00	7
U.K.	57	95	53	80	61	62	86	66	7.88	8
Italy	14	92	12	86	79	91	67	63	6.88	9
France	31	78	21	59	90	84	80	40	6.00	10
Luxembourg	26	71	16	72	70	82	78	88	5.75	11
Ireland	35	67	29	69	75	71	76	58	4.50	12
Greece	7	78	29	53	34	100	47	32	3.50	13
Spain	16	56	11	55	75	76	56	56	2.75	14
Portugal	21	60	8	33	43	89	45	40	2.50	15

Source: SIBIS 2002

In the subsequent table countries are ranked according to their mean ranking in the eight variables representing company-centred flexibility. Here, the country sequence is somewhat different. The U.K. ranks best followed by Sweden, the Netherlands and Finland.

[20] Inverse average rank of 8 benchmarked variables

Table 4.5 AWAI values – Sub-index on company-centred flexibility

Dimension	TIME		PLACE		CONTRACT		CONTENT			
Indicator	Part-time working	Atypical working hours	Mobile teleworking	Tele-Cooperation	Employment Protection in Legislation	Involuntary temporary workers	Management by Objectives	Employee training provided by company	AWAI Company-centred Flexibility Index[21]	Country rank
U.K.	59	81	76	88	100	14	75	91	10.50	1
Sweden	57	69	79	93	58	37	80	95	9.88	2
Netherlands	100	68	66	80	58	39	100	92	9.63	3
Finland	29	80	100	99	64	37	66	85	9.25	4
Denmark	48	66	44	100	78	14	98	100	9.00	5
Germany	48	71	92	82	49	21	62	78	7.38	6
Belgium	43	74	39	67	64	24	74	73	7.25	7
Ireland	39	80	68	66	89	6	66	82	7.13	8
France	39	79	34	46	42	43	72	79	6.75	9
Austria	42	75	60	64	58	10	68	75	6.38	10
Italy	20	88	89	63	38	21	66	16	5.38	11
Spain	19	94	13	38	40	100	66	38	5.38	11
Greece	9	100	56	23	33	39	57	19	4.25	13
Luxembourg	24	70	24	76	64	8	53	74	3.88	14
Portugal	26	71	5	18	29	39	67	23	3.63	15

Source: SIBIS 2002

Comparing both indices, some differences strike the eye: A few countries, such as the U.K. and Ireland, get as higher score on the company-centred index than on the worker-centred index. In these EU Member States, flexibility on labour markets seems to benefit mainly employers. On the other hand there are countries like Austria, Italy and Luxembourg, where flexibility in the labour markets seems to be distributed in favour of workers, while companies may be in need of a more flexible regulatory environment (or, one has to add, make better use of the potential for flexibility that already exists).

The Nordic countries and the Netherlands stand out as scoring high in both indices. These Member States seem to come closest to reaching the aims of the European Employment Policy. At the other end of the ranking order, Spain, Greece and Portugal still seem to have a long way to go before they reach at least EU average levels of labour market flexibility and adaptability.

The research on AWAI is a work in progress, which means that the selection of input indicators is by no means considered to be finite. In particular, availability of data places constraints on the possibility to input indicators that more precisely reflect changes in labour markets.

The AWAI as described can be seen as a successful attempt to adequately map the progress of EU Member States in meeting the objectives of the European Employment Policy and their preparedness and work environment-related prerequisites for e-business. It clearly distinguishes

[21] Inverse average rank of 8 benchmarked variables

the countries with the most favourable conditions and environments for an e-business uptake (Netherlands, Finland, Denmark) from those providing the less dynamic e-business environments in Europe (Spain, Greece and Portugal).

At the same time it makes explicit the potential divergence between worker-centred and company-centred labour market flexibility - a divergence which is also to be found in the economic and labour market policies of many EU Member States, and - it may be argued - of the European Commission itself. Resolving this contradiction will continue to be a major challenge for the EU in the coming years.

4.2.3. Conclusions

SIBIS showed that the use of more complex, integrated, and interoperable solutions has made some inroads, but overall uptake is still relatively small. It is possible that security fears, the value added of such activities, and the compatibility of differing systems still poses significant barriers. This is a significant action area for eEurope 2005, and therefore results would suggest further research in the application of standards across the economic landscape to improve interoperability.

SIBIS also addressed the issue of flexible working, which was not covered in eEurope 2005, but is certainly part of e-business readiness. In a broader sense, SIBIS did not restrict itself directly to ICT-based ways of working. The proposed measurement (the AWAI - Adaptability of Work Arrangements Index) captured worker-centred flexibility and company-centred flexibility. This novel approach provided interesting insight into the general and ICT enabled flexibility of Europe's workforce. Results showed the Netherlands, the benchmark for five out of the eight indicators, come out first, followed by the Nordic countries Sweden, Finland and Denmark, with Spain and Portugal leading at the tail end. However, the focus of work was on the topics of "telework" and "tele-cooperation" which have been identified as areas in which existing indicators are not adequately representing the nature of ICT-enabled changes to working locations.

5. A secure Information Infrastructure

5.1. Security and trust

5.1.1. EU policy goals and definitions

The EU has recently launched a comprehensive strategy based on the Communications on network security, cyber crime and the current and forthcoming data protection directive regarding electronic communications. Based on the 28 January Resolution 2002, a number if initiatives (e.g. the establishment of a cyber security task force, awareness campaigns, promotion of good practices, and improved exchange of information mechanisms) should be completed by the end of 2002. This is an important step towards a secure information infrastructure in Europe[22].

Under FP6 community research focuses mainly on trustworthy network and information infrastructures with an emphasis on emerging technologies and on the identification of vulnerabilities and inter-dependencies in infrastructures.

eEurope 2005 propose three actions, i.e. the creation of a Cyber Security Task Force (CSTF) by mid 2003, the achievement of a 'culture of security' in the design and implementation of information and communication products by the end of 2005 and the establishment of a secure communication environment for the exchange of classified government information[23].
The following policy and supplementary statistical indicators have been proposed by the European Commission.

SIBIS indicators on "Security and Trust" cover part of the eEurope benchmarking indicators on a "secure information infrastructure".
The eEurope benchmarking indicators focus on Internet users' experience and usage regarding ICT-security. Also SIBIS indicators consider these issues. However SIBIS has also developed indicators on the level of concern of individuals and their sense of responsibility for the security of the information society.
The table above presents the indicators that bring equivalent, similar or complementary results to the ones proposed above for the eEurope 2005 work.

[22] eEurope 2005: An information society for all, pp. 15-16
[23] Ibid

Table 5.1 The EC's eEurope 2005 benchmarking indicators and SIBIS's equivalent/supplementary indicators

eEurope 2005 benchmarking indicators	Equivalent SIBIS indicator
Policy indicators I. 1 Percentage of individuals with Internet access having encountered security problems I. 2 Percentage of enterprises with Internet access having encountered security problems **Definition:** Security problems defined for individuals as credit card fraud, computer viruses and abuse of personal information; and for enterprises, broken down by enterprise size (10-49; 50-249; 250+), as computer viruses, unauthorised access to systems or data and blackmail/threats against the enterprise data or software that have occurred in the last 12 months. **Source**: Eurostat /NSI ICT household/enterprise survey Frequency: **Annual, first deliverables 2003, second October 2004, third October 2005, with as reference period 3rd quarter 2003/4/5** Supplementary indicators: **Not covered under the scope of SIBIS.** I.3 Percentage of individuals having taken ICT security precautions within the last three months. I.4 Percentage of enterprises having taken ICT precautions within the last three months. I.5 Percentage of individuals and enterprises that have installed security devices on their PCs and updated them within the last three months.	**Security & trust indicators:** Concerns regarding on-line security and privacy **Source:** GPS Security breaches occurred in the organisation **Source:** DMS Types of information breaches occurred in EU7 businesses **Source:** DMS **Other security & trust indicators** Damage Severity Index (Compound indicator) **Source**: DMS Reporting of on-line violations **Source:** GPS Presence of security policies **Source:** DMS Tools for information security **Source:** DMS

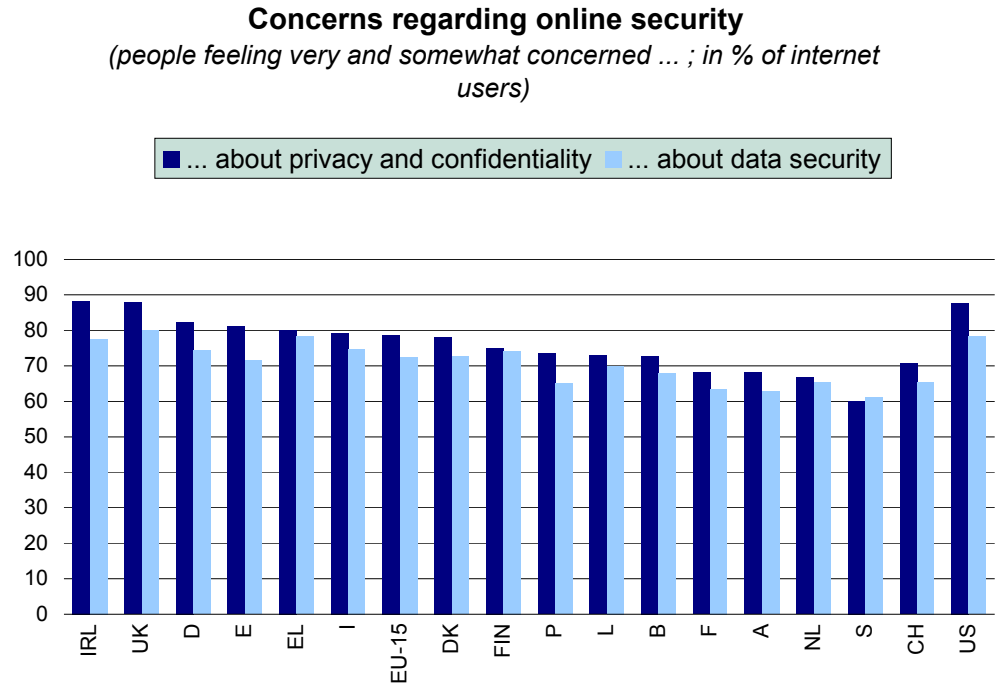
Source: eEurope 2005 and SIBIS

5.1.2. Results from SIBIS

5.1.2.1. Security problems for individuals

A contribution to understanding security problems and their impact on the way individuals perceive the Internet is the indicator on concerns regarding on-line security, developed and tested in SIBIS. The population survey considers this indicator, tackling the issue of citizens' concerns over security, privacy and confidentiality. The figure below shows the percentage of concerned individuals in the EU, Switzerland and the US. Although this cannot be linked *sic et sempliciter* to the *percentage of individuals with Internet access having encountered security problems* (EC indicator I.1), it does help to enable a better insight in the progress towards dealing with security breaches.
It appears that citizens are strongly concerned both about privacy/confidentiality and about data security, although there is a slightly higher concern about privacy. It is also remarkable that concerns (particularly on privacy) are highest in the UK, Ireland and the US, as opposed to continental Europe. Security concerns can also be related to the propensity to report on-line violation (see figure 6), security policies and measures taken in different enterprises (see figures 4 and 5 below).

Figure 5.1 Concerns About Data Security and Privacy per country
Question: "How concerned are you about …
… data security on the Internet, i.e. the loss or manipulation of your data?
… privacy and confidentiality on the Internet, i.e. personal information about you being misused by third parties?



Percentage of all regular Internet users (N = 5944)
Source: SIBIS 2002, GPS

Further research to the reasons why could either show a higher amount of negative experiences, more trust in the functioning of society-at-large or the level of awareness.

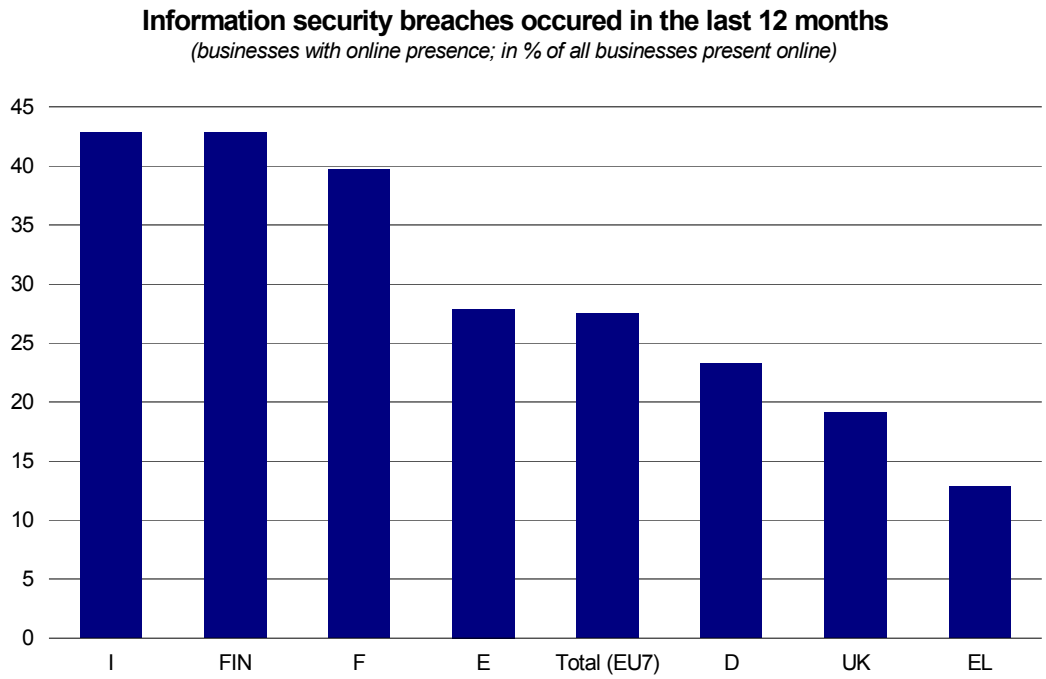
5.1.2.2. Security Problems for enterprises: SIBIS indicators

To foster actions ensuring a secure information infrastructure it is essential to know people's concerns. But, for better understanding the reasons for such concerns, it is also crucial to gain information on what sort of breaches organisations suffer, in what way they try to avoid them (see fig. 5), what priorities they have in terms of information security (see fig. 4) and what barriers they face in setting up an information security policy. The eEurope 2005 Action Plan clearly stresses the need for such actions, and SIBIS addresses relevant issues through a number of indicators.

SIBIS collected various indicators on enterprises in seven selected countries. Closely related to the EC indicator I.2 (*percentage of enterprises with Internet access having encountered security problems*), SIBIS developed and tested an indicator on information security breaches in different organisations. In SIBIS "breaches" are intended as identity theft, on-line fraud, manipulation of software applications, viruses and unauthorised entry in internal networks.
The figure below portrays the percentage of enterprises with on-line presence encountering breaches during the twelve months previous to the survey. Italy appears to be the most hit, while the lowest number of breaches was encountered in Greece. However, it is difficult to draw straightforward conclusions on the reasons behind these results. Although Greece seems to suffer

the lowest number of breaches, it also has the lowest number of organisations surveyed and with on-line presence, as opposed to, for instance, Finland. Italy, on the contrary, has a low percentage of establishments on-line, but more were actually surveyed.
Although a promising indicator in itself, because the actual number of interviewees was limited, a confident interpretation of these results does not seem possible at this stage, and further investigation is needed.

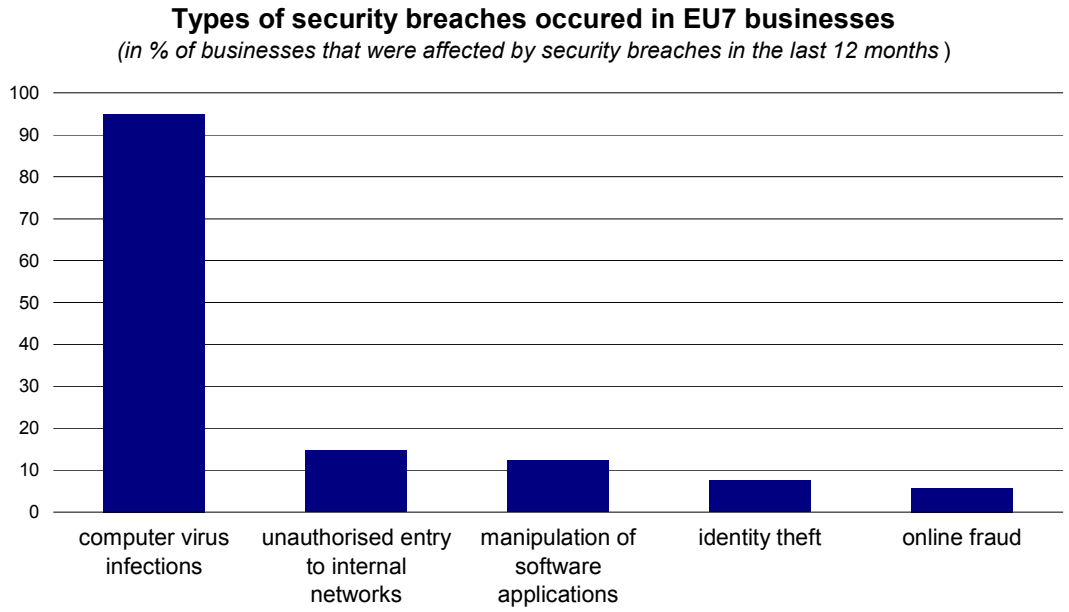
Figure 5.2 Information Security Breaches Occurred in the Last 12 Months
Question: "Have any breaches of your information security occurred in your establishment in the last 12 months?"



Percentage of all businesses present on line, weighted by employment (N= 1857).
Source: SIBIS 2002 DMS

In order to be able to take measures it is important to understand the kinds of breaches that actually occurred. SIBIS data shows that the overwhelming majority of organisations have been affected by computer viruses. In most cases, this was the most evident security breach. The number of security breaches reported, such as unauthorised access to their networks, or identity theft show to be fairly low in all countries surveyed.

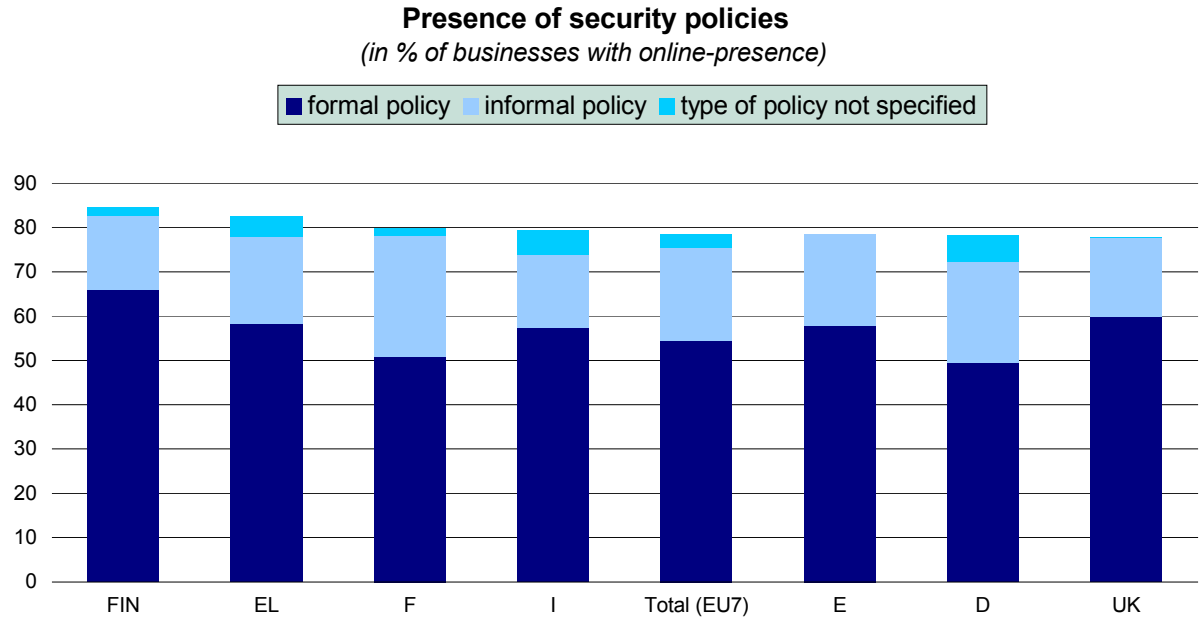
Figure 5.3 Types of Security Breaches Occurred in EU7 Businesses
Question: "Which of the following types of information security breaches have occurred in your establishment in the last 12 months? Did you experience cases of..."



Percentage of all businesses present on line and that suffered breaches in the last 12 months, weighted by employment (N = 514);
Source: SIBIS 2002, DMS

Finally, to foster actions for information security it is essential to know how organisations deal with their security risks. In other words, it is necessary to be informed on precautions taken and tools used. On the first question, SIBIS developed an indicator that is closely related to the one suggested by eEurope 2005 (EC Indicator I.4, *percentage of enterprises having taken ICT precautions within the last three months*). SIBIS measures the percentage of organisations with on-line presence adopting an information security policy and pinpoints its formal or informal nature. Figure 4 shows that the overall majority of organisations have an information security policy and in more than 20% of the cases it is "formal". The fact that, with the exception of virus infections, the number of breaches is fairly low suggests that implementing a security policy pays after all; on the other hand, the overwhelming presence of computer virus incidents (above 90% in European establishments), suggests the need for further action, for example in terms of training and awareness.

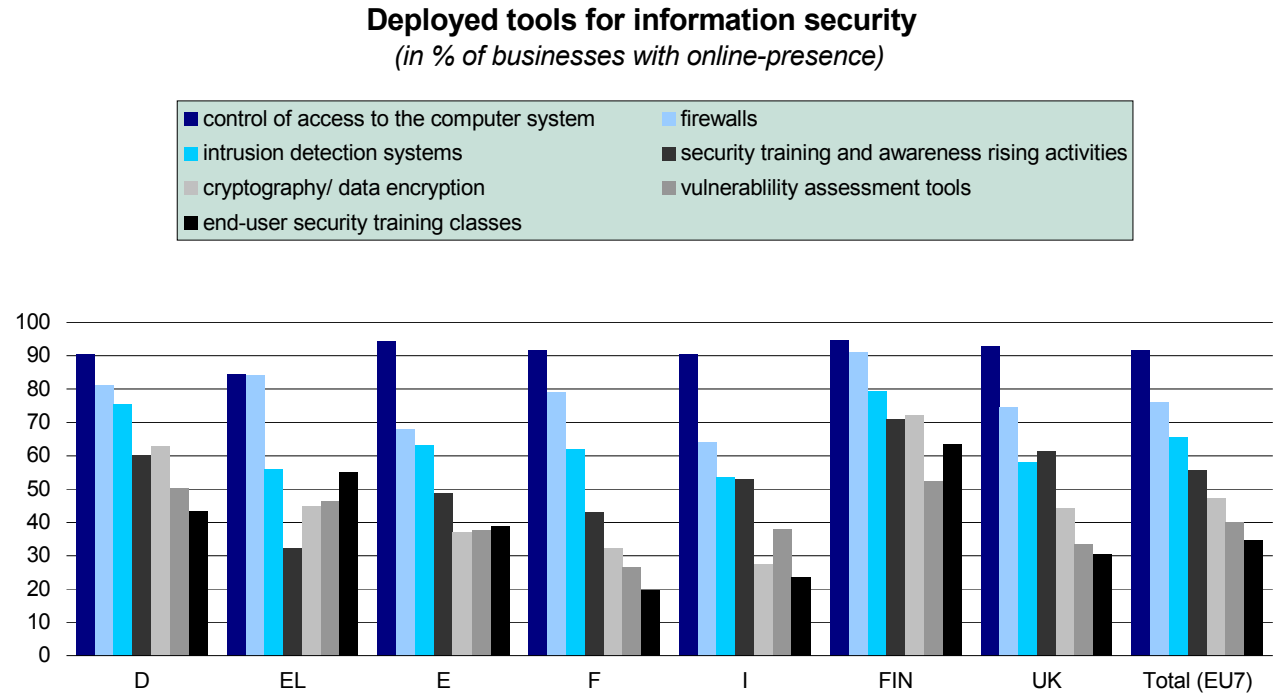
Figure 5.4 **Presence of Security Policies. Percentage of all businesses present on line, weighted by employment (N = 1857)**
Question: "Does your establishment or your organisation have an information security policy? - How would you describe it? As formal or informal?"



Source: SIBIS 2002, DMS (N= 1857)

Although SIBIS does not develop indicators matching exactly the eEurope 2005 benchmarking indicator I.5 (*Percentage of individuals and enterprises that have installed security devices on their PCs and updated them within the last three months*), the enterprise survey explored the indicator *tools for information security* in European organisations. Figure 5 shows that, in all instances, controlling access to the computer system is the most deployed tool for ensuring information security, while training and awareness raising remain partly unused alternatives (although generally about half of the establishments carry out these options too).

Figure 5.5 Deployed Tools for Information Security
Question: "Which of the following tools do you use for information security in your establishment? Do you make use of…"



Percentage of all businesses present on line (N = 1857);
Source SIBIS 2002, DMS

There is no SIBIS indicator that considers explicitly the issue of individuals taking ICT precautions (EC indicator I.3, *percentage of individuals having taken ICT precautions within the last three months*). However, in order to take precautions it is important to know what is going on. Particularly with viruses, but also with other kinds of attacks to on-line systems an early warning by the first users suffering will help other users world-wide to take measures to protect themselves, in time. Initiatives for sharing information on vulnerabilities, dependencies, threats and incidents are high on the agenda[24].

Recent research again confirmed that it is difficult to find data on on-line violations, and there are hardly any trans-national data that is comparable nature. The SIBIS survey shows that there is a high preparedness to report, across the board (never below 68%), so putting the right mechanisms in place may well pay off.

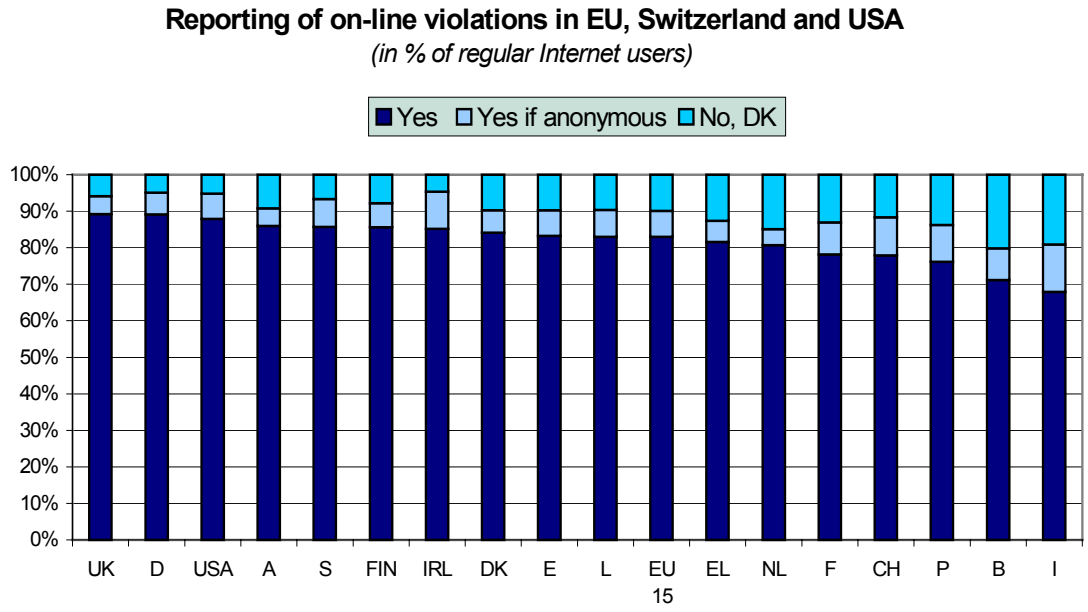
SIBIS data also show that for individuals the ability to report anonymously only marginally affects the willingness to report; in this individuals differ from enterprises[25]. In what way the willingness to report violations and the impact of anonymity varies for different kind of intrusions (viruses to unauthorised access &c.) is a next step to explore. Figure 6 describes these issues.

[24] On information sharing and early warning see DDSI, Information Sharing Roadmap and Final Report of a Workshop held in Brussels 17-18 January 2002 on "Warning and Information Sharing", also available at http://ewis.jrc.it

[25] See for example DDSI final Report

Figure 5.6 Reporting of on-line violations in the EU, Switzerland and the USA

Question: Would you report violations of your on-line security, privacy and confidentiality to a third independent party, for example a public agency created for this task? - Would it be easier for you to do so if you could do it anonymously?



Percentage of all regular Internet users (N = 5944);
Source: SIBIS 2002, GPS

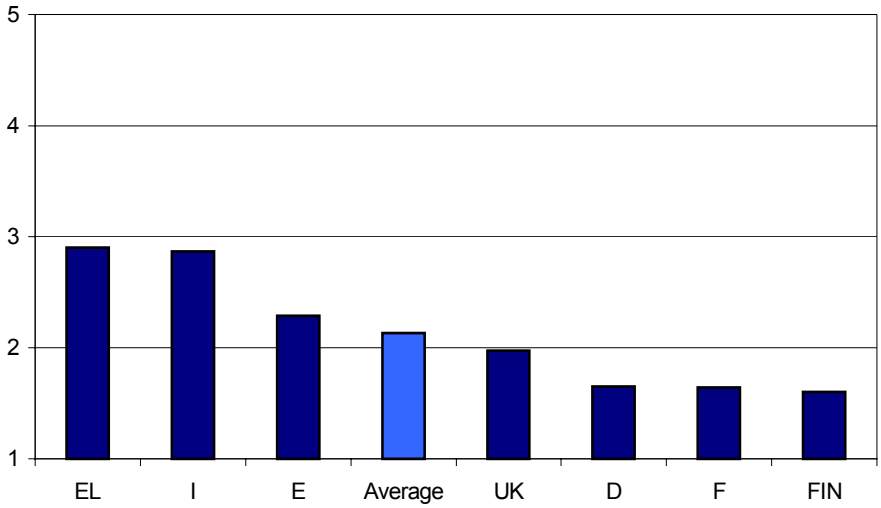
In addition, it must be said that there is a relation between deployed tools for information security and the adoption of security policies. It can be argued that the higher the presence of security policies, the higher the measures taken all over.

5.1.2.3. Compound security indexes by SIBIS

SIBIS developed a compound indicator, called DSI (*Damages Severity Index*), which assesses the severity of damages caused by different kinds of breaches in the seven countries selected for the enterprise survey. The DSI could contribute to a better understanding of EC indicator I.2. It is a combination of five distinct indices, which are weighted averages measuring how substantial the damages of ID theft, on-line fraud, manipulation of software applications, computer viruses and unauthorised entry were. In each case, a weight of 5 to "very substantial damages", 3 to "rather substantial", 1 to not substantial and 3 to "DK" has been allocated.
The DSI is a mean of these sub-indices, and therefore higher values correspond to higher severity of damages. The values range from 1(situation in which there were no damages) to 5 (a situation in which all breaches caused substantial damages). The outcome shows Greece as performing poorly on this aspect, while Finland being the country where damages were the least substantial. Data suggests that Greece, with few establishments on-line and a low occurrence of breaches, is nonetheless more prone to suffering substantial damages; Finland, on the contrary, notwithstanding a high number of breaches, seems to be less hit in economic terms. These results might imply that breaches in Finland are less intense, maybe because of better security policies.

However, in view of the low number of respondents such conclusions are somewhat speculative and further research is needed.
Although it does not refer directly to the occurrence of breaches, nonetheless it can be a useful complement to eEurope indicator I.2.

Figure 5.7 Damages Severity Index



Source: SIBIS 2002, DMS (N = 1857)

5.1.3. Conclusions

SIBIS examined more indicators than those proposed by the draft benchmarking indicators, providing interesting perspectives on the pervasiveness of e-security infrastructure and culture. SIBIS found that citizens are strongly concerned both about privacy/confidentiality and about data security, although there is a slightly higher inclination to be concerned about privacy. SIBIS also found that enterprises with on-line presence encountering security breaches correlated to the comprehensiveness of the security policies/infrastructure – with Finland being interesting in this regard. Also, the fact that, with the exception of virus infections, the number of breaches is fairly low suggests that implementing a security policy pays after all; on the other hand, the overwhelming presence of computer virus incidents (above 90% in European establishments), suggests the need for further action, for example in terms of training and awareness. Interestingly, SIBIS data also showed that for individuals the ability to report anonymously only marginally affects the willingness to report; in this individuals differ from enterprises. In what way the willingness to report violations and the impact of anonymity varies for different kind of intrusions (viruses to unauthorised access & c.) is an avenue of further exploration.

6. Broadband

6.1. Broadband and access

6.1.1. EU policy goals and definitions

Broadband is the linchpin of eEurope goals. It is the enabler for the provision of more interactive services, across the four domains of, e-government, e-learning, e-health, and e-business, and as such is considered to have a significant economic impact. In driving the diffusion of broadband, the Commission recommends that Member States should increase competition in the local loop, driving prices lower and generating innovation. Also, the Commission states that other policy activities are required, especially concerning increasing uptake in less favoured regions. Also, the ability of public authorities to offer content on different technological platforms is seen as an important driver, and therefore the development of multi-platform content will be promoted by the demonstration of research projects.

Under the scope of SIBIS several indicators tracked the penetration and use of broadband (BB) technologies among EU Member States, Switzerland and the US have been also developed. The table below includes proposed eEurope 2005 BB indicators:

Table 6.1 The EC's eEurope 2005 benchmarking indicators and SIBIS's equivalent/supplementary indicators

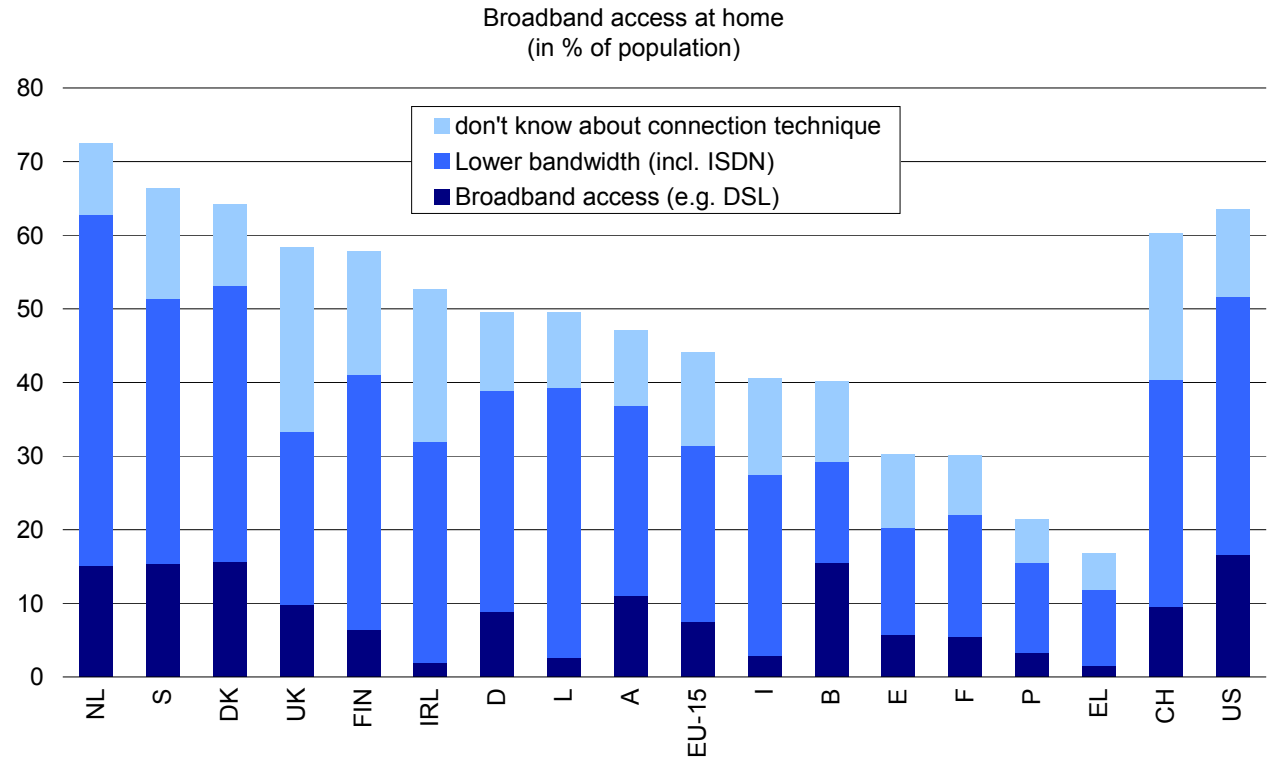
e-Europe 2005 benchmarking indicators	Equivalent SIBIS indicator
Policy indicators J. 1 Percentage of enterprises with broadband access J. 2 Percentage of households with broadband access: J. 3 Percentage of public administrations with broadband access (to be defined). **Definition:** Broadband defined as high speed e.g. ADSL, cable, satellite, fixed-wireless, LAN and UMTS (in the future). Tables to be broken down by type of entity. **Source:** Commission study/ Eurostat /NSI ICT household/enterprise survey **Frequency:** Annual, first deliverables 2003, second October 2004, third October 2005, with as reference period 3rd quarter 2003/4/5 **Supplementary indicators: Not covered under the scope of SIBIS.** J.4 Difference between availability and take-up of high-speed Internet access. J.5 Broken down by type of access J.6 Percentage of households equipped with home networking connections (to be included when available)	**Broadband access and impacts indicators:** The indicator (J1) is not covered by SIBIS 1. Percentage of households with broadband access according to the type of connection at home. The indicator (J3) is not covered by SIBIS **Definition:** User segmented by Dial-up with modem; (narrowband), ISDN (midband) and xDSL/T1/T3,cable modem (broadband) and other (satellite). **Source:** SIBIS GPS **Collection date:** 2002 for EU15 **Other broadband and access indicators:** 2. Share of Internet users with broadband access.(broken by countries and age groups) 3. Fast speed Migrators: Share of Broadband users who previously subscribed to a slower service (e.g. dial-up connections). 4. Compound Indicators: Migration to fast connections Snapshot. 5. Bbusers according to intensity of use

Source: eEurope 2005 & SIBIS

6.1.2. Results from SIBIS

6.1.2.1. Users according to type of connection at home: Share of Internet users with broadband, mid-band, and narrowband access

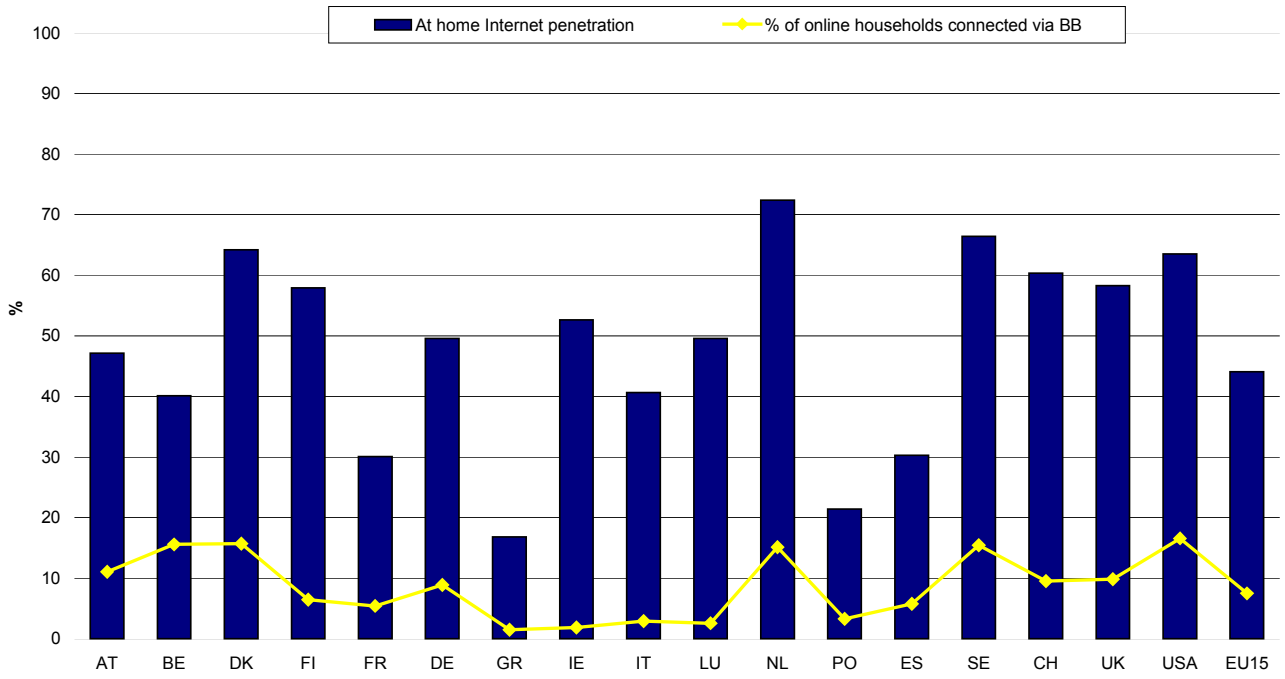
Figure 6.1 Internet users according to bandwidth of at-home connection (EU15, Switzerland & US)
Question GPS: A11
Will read to you a number of methods to access the Internet. Which of these do you use at home?
MULTIPLE ANSWERS
(1) Dial-up with modem; (2) Cable Modem; (3) Leased line; (4) xDSL; (5) ISDN; (6) T1 or T3 line [TRANSLATOR: Digital Multiplex connection]; (7) Internet access via satellite; (8) Other not mentioned (e.g. mobile); (9) DK



Base: all respondents (N=11832), weighted; EU15 results weighted by EU15 population (N=10306).
Source: SIBIS 2002, GPS (% Online households and BB penetration figures as April, 2002)

The above figures illustrate the level of broadband enabled penetration among at-home users in European Member States, Switzerland and the US. According to the data, in the European Member States (EU15), currently (April, 2002) approximately 7% of at-home users' connections are broadband users. While behind the US, who had over 16%, there are individual countries that seem to have equally high levels of broadband penetration. For example, Belgium which benefits from a dense urbanised geography where access to telecom networks such as cable is relatively easy. The data also portrays how Greece is quite far behind the rest of EU countries where at-home Internet connections are concerned, with over 80% of the Greek population not having at-home connections.

Figure 6.2 Percentage of online households connected via Broadband for the EU15, Switzerland, and the US

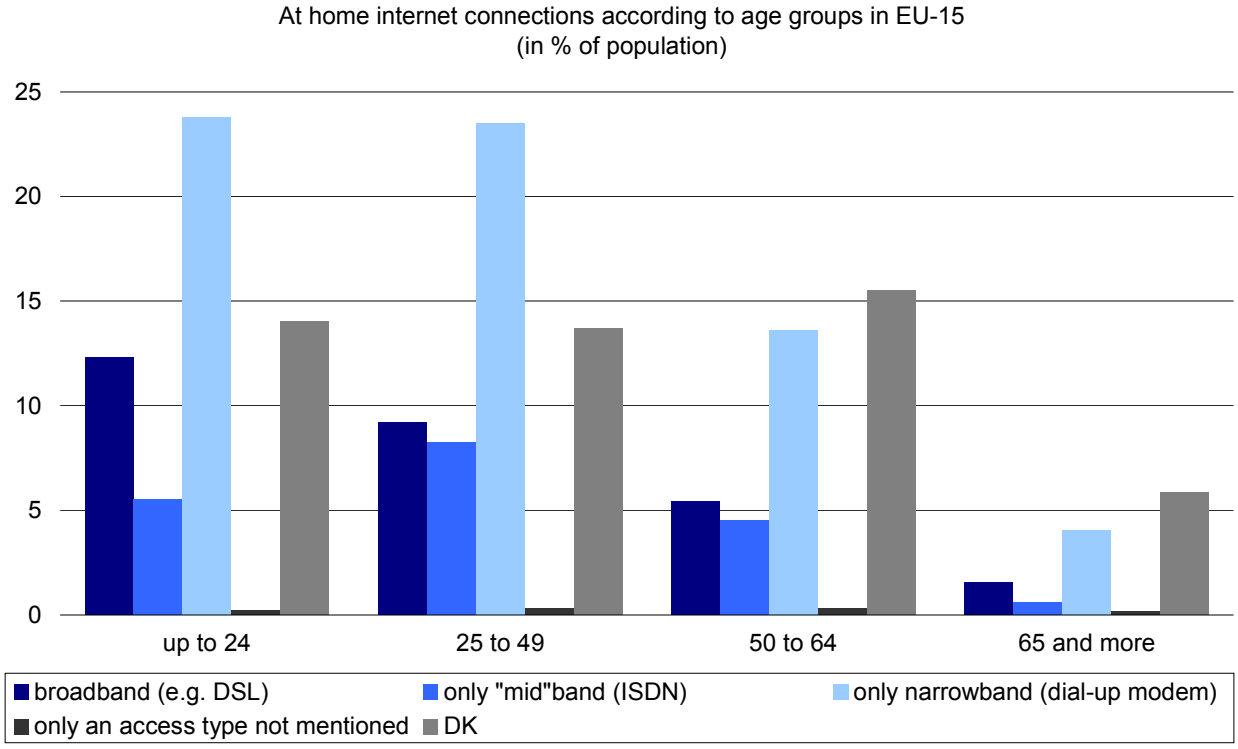


Base: all respondents (N=11832), weighted; EU15 results weighted by EU15 population (N=10306).
Source: SIBIS 2002, GPS (% Online households and BB penetration figures as April, 2002)

It is important to highlight that in some countries broadband penetration has increased dramatically since this data was collected (mainly in countries were Internet residential penetration is traditionally higher). For example, since last spring the US has shown a twofold + increase in broadband penetration compared to the EU15 average. The UK is another example of a country which has increased its broadband penetration at a much faster rate that some of its European counterparts. This may be because of the introduction of cheap-rate ADSL over the last year. However, generally when looking at the state of implementation of the eEurope target areas the high-bandwidth, multi-platform ideal access environment is still far away in Europe.
Competitiveness in the broadband market in Europe is still generally low. Most users upgrading to broadband are subscribing to incumbents deals. Even though it is two years since Member States were required by EU law to open their local exchanges to enable competing operators to provide DSL latest figures from February 2003 the European Competitive Telecommunications Association (ECTA) revels that still less than 5% of the nearly 200 million telephone lines in the EU are equipped for DSL. Moreover, over 80%current DSL exchanges are incumbents ones

An interesting methodological issue is related to the fact that telephone survey methodologies are biased towards broadband technologies. Since narrowband heavy users (especially for those countries where flat-rates are available) are more likely to have their telephone lines busy and hence are misrepresented in telephone surveys compared to broadband users who have their telephone lines available.

Figure 6.3 **Internet users according to bandwidth of at-home connection by age groups.**
Question (as in previous figure) - data broken by age groups according to Eurostat classifications



Base: all respondents weighted by EU15-population (N=10306)
Source: SIBIS 2002, GPS

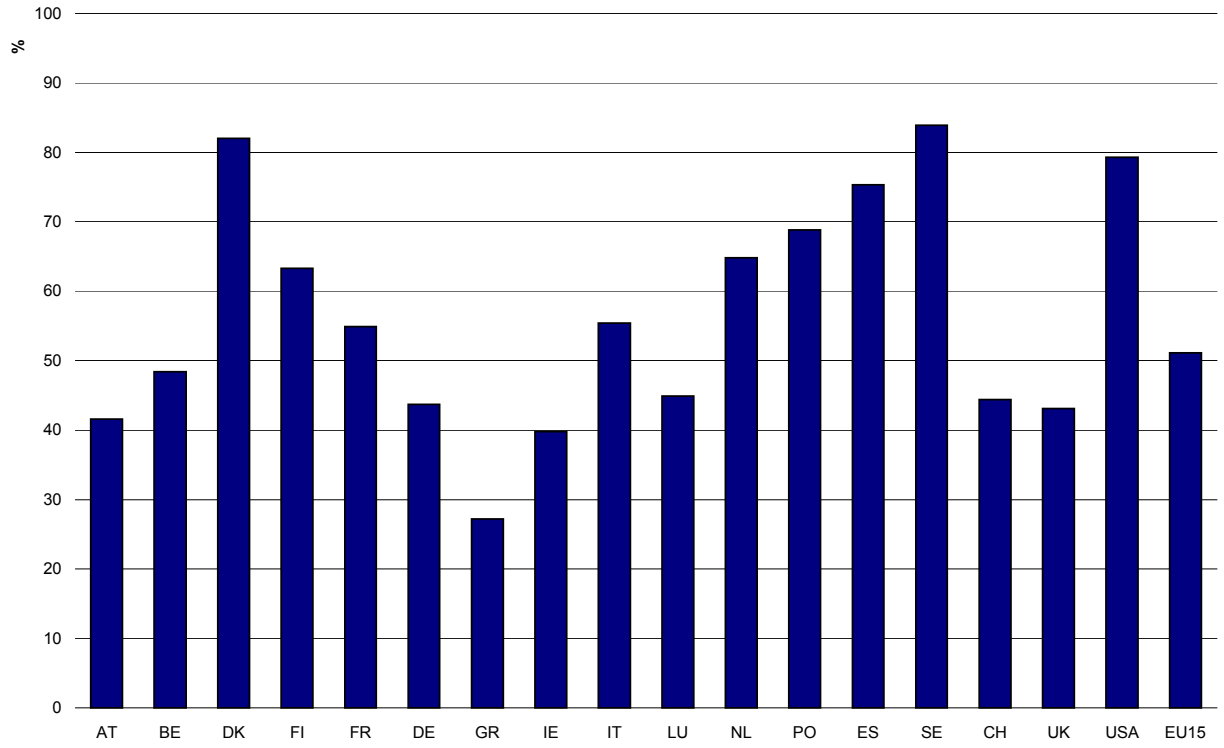
Younger user groups are driving the growth of broadband access in the EU15. Looking at Internet connections at home according to age groups, SIBIS results indicate that people between the ages of 24 and 49 show higher adoptions rates of both high speed and slow at-home connections. This correlates well with other indicators. For example, the young are also more likely to migrate from low-speed to higher speed connections, and are traditionally described as early technology adopters. It is also the young who tend to be more interested in downloading digital media, thus they show higher interest in upgrading to broadband.

Within SIBIS we have followed the age groups classification adopted by Eurostat surveys. However SIBIS has noted that for developing indicators on Internet technologies, for future work it would be useful to include at least one more additional age interval and track users between 25 and 35 years old, and then include an additional category for 36 to 49 years old. Data analysis has shown that age is very relevant factor to distinguish user patterns in technology adoption.

6.1.2.2. Additional SIBIS indicators

Migrators to faster Internet connections than dial-up

Figure 6.4 At home, did you have a connection before which was slower than the current one?



Base: respondents with Internet fast connections at home (midband and broadband), who used to subscribe before to a slower service (N=1621), weighted. EU15 results weighted by EU15 population (N=1376).
Source: SIBIS 2002, GPS. Column percentage.

Understanding the migration path from dial-up connection to broadband access is important if measures to encourage its adoption are to be better formulated. The US experience indicates that long experienced narrowband users migrate to broadband because of the better quality of access and the faster and persistent connections associated with it. Likewise, the closer the narrowband and broadband gap is in relation to connection prices, the more likely users are to migrate from narrowband. This measure is important for informing policy that encourages broadband usage. The figures suggest that migration to a faster connection than dial-up is highest in the US, Sweden, Spain, Portugal, Finland, the Netherlands and Denmark. A high share of migrators to broadband in a country could indicate a certain level of sophistication in usage, or perhaps indicate which countries have cheaper higher-speed connections. Hence the next step in indicator development in this area would be to explore the satisfaction levels of people with connections, why they migrate and what barriers are present which stop them upgrading to broadband.

SIBIS results correlate well with those seen by Oftel's research in the UK[26], which have shown that a third of PSTN/IDSN home Internet users are interested in upgrading to broadband (e.g. DSL or

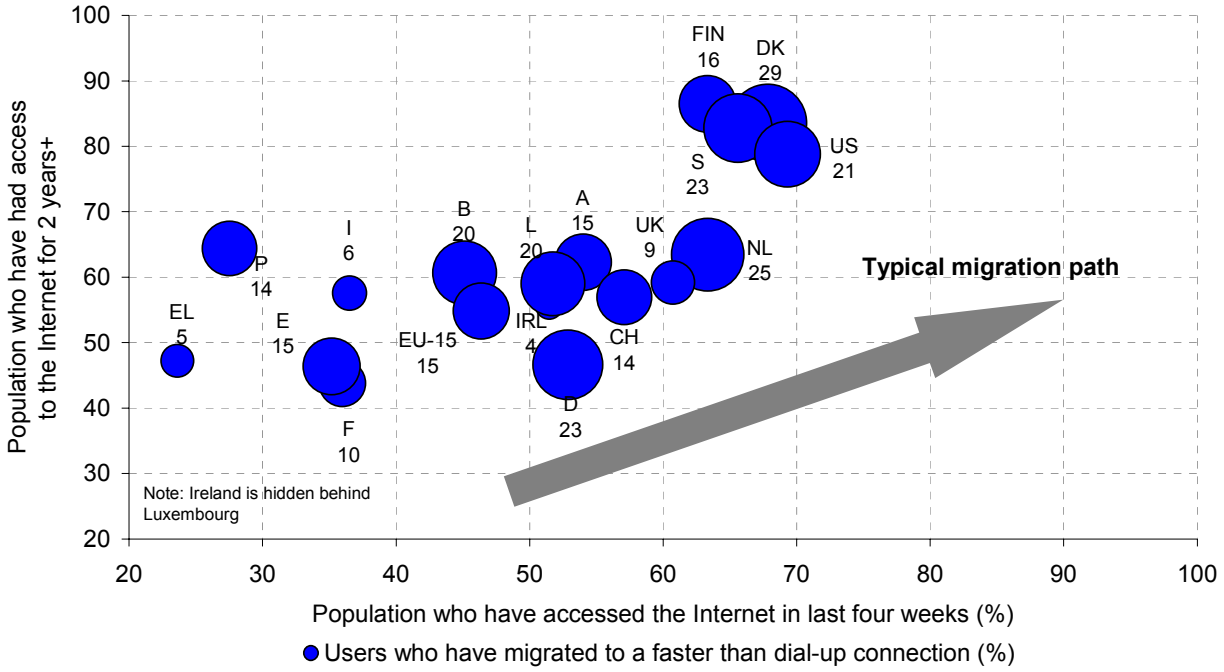
[26] Oftel's monitoring broadband and Internet studies, quarterly 2002.

cable modem). Their results also have shown that users' interest increases with usage. In fact around twice as many of the heavier users in the UK are interested (54%) as light users (24%). In addition, it was shown that in the UK those at-home users currently using an un-metered product were also more likely to be interested in upgrading compared to those paying for subscription and calls.

According to these results SIBIS developed a compound indicator in order to explore the relationship between being an active online user, with a high tenure (e.g. 2 years+ using the Internet) and having migrated to a faster connection than narrowband. The results of this compound indicator are presented below:

Other indicators: Migrators snapshot

Figure 6.5 At home active users with two years plus tenure who have migrated to faster connections than narrowband



Source: Technopolis multivariate analysis of SIBIS 2002, GPS

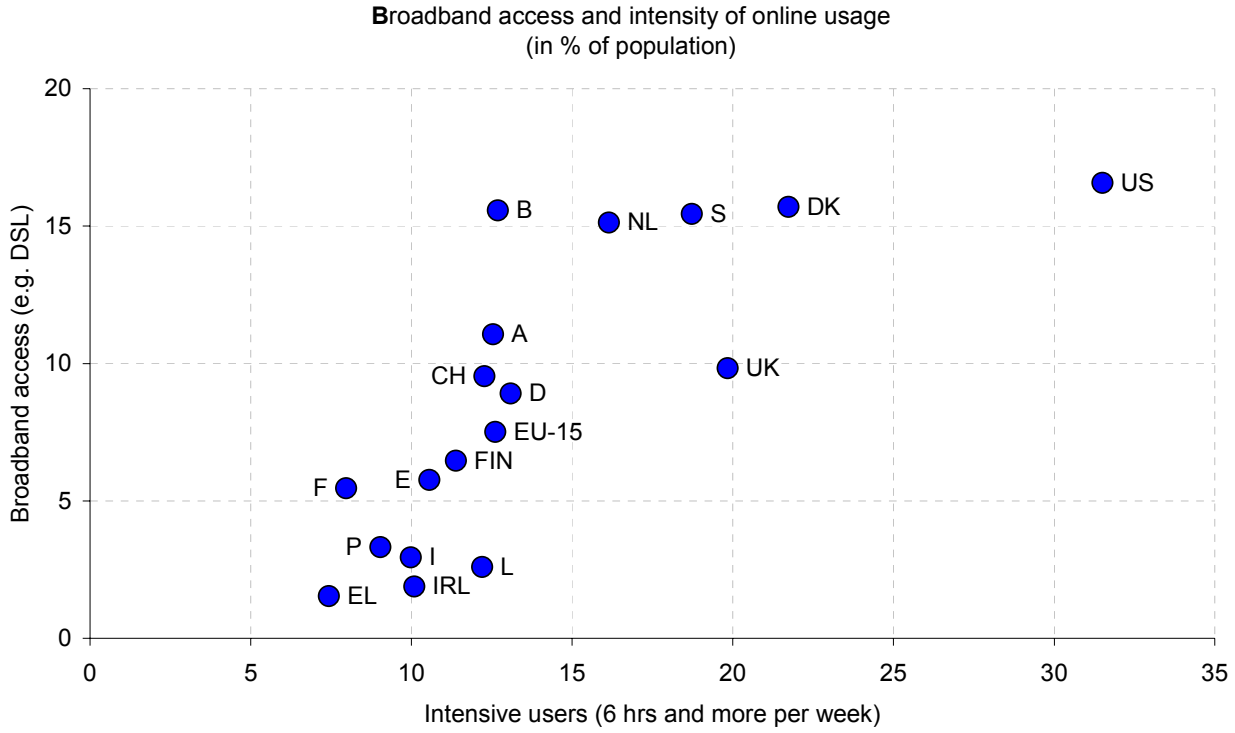
Traditionally two factors have influenced when Internet users migrate to a faster connection. Based on the experiences of the US and Scandinavian markets, it has been noted that once a majority of a total population has Internet access, there is a migration of users with tenure, commonly defined as those with two years or more Internet experience, to faster connections. They seek a better online experience e.g. quicker downloads, always on connections. The clustering of the US, Sweden, Finland and Denmark illustrates this in the cluster of bubbles portrayed above. Not only do they have relatively high percentages of regular (those who access the Internet at least once in the last four weeks) and tenure experienced Internet users, but the size of the group with faster connections than dial-up, is large too. In comparison, there is a clear second cluster of countries where this migration level is lower. The exception here seems to be the Netherlands which

registers similar migration levels, as can be seen in the bubble size, despite having lower amount of users in the last four weeks with more than two years tenure than the first cluster of countries.

In addition to decreasing the price gap between narrowband and broadband subscription rates, an important factor to boost migration has been the introduction in Europe by Broadband Service Providers (BSPs) of self-installing software packages. One of the major barriers in upgrading to broadband was the high associated costs with the installation. This can now be done easily at-home, substantially reducing the initial costs for shifting to broadband. This recent factor has been one of the major drivers to broadband adoption in 2002, not only in Nordic countries, but also in Mediterranean countries.

Other indicators: Broadband connection according to Intensity of use

Figure 6.6 Broadband connection according to Intensity of use



Source: Technopolis analysis of SIBIS 2002, GPS

The figure portrays a clear association between having a broadband at home connection at home and intensity of Internet use. SIBIS shows how in countries with higher broadband penetration rates at home, users tend to spend longer online per session when compared with narrowband users. This indicates not only that broadband encourages users to use the Internet more, but also that the broadband technologies allows them to get a greater and more effective online experience than narrowband users. Those who move to higher bandwidth seek a better online experience, for example, through quicker downloads or always on connection that enable better exploitation of the potential benefits of the Information Society.

6.1.3. Conclusions

SIBIS found that in European Member States, approximately 7% of at-home users' connections are broadband. While behind the US, which had over 16%, there are individual member states that seem to have equally high levels of broadband penetration. However, across the EU there are tremendous variations of uptake. It is important to highlight that this situation can be reversed quite quickly, given that in some countries broadband penetration has increased dramatically. For example, since last spring the US has shown a twofold increase in broadband penetration compared to the EU15 average. The UK is another example of a country which has increased its broadband penetration at a much faster rate that some of its European counterparts. This is considered in part to be through the introduction of more favourable ADSL connection packages. Also, younger user groups are driving the growth of broadband access in the EU15. Driving this uptake are people between the ages of 24 and 49, showing higher adoptions rates not only for high speed connection, but dial-ups as well.

7. Main findings and conclusions

Internet access and use are rising: but a significant proportion of EU citizens still do not access the Internet from any location

The results of the SIBIS survey show that the Information Society has arrived, and its relevance continues to grow. Currently more than half of the adult population use the Internet on a regular or occasional basis. One in three use email, one in five look for health information online, and one in five have undertaken e-Shopping. Even one in seven regularly participate in e-Banking. Crucially, within Europe basic home Internet access is increasing, as is Internet usage intensity at work, appearing to close the gap on the US. However, there still remains a significant segment of the EU population who do not access the Internet at home or at any other location, not even via PIAPs – although these where shown to be an important part of the IS. Statistically these are more likely to be female, the elderly, the retired and less educated citizens.

This position may be improved as EU citizens make good use of alternate platforms, but again not to the same extent as the US. Moreover, US citizens are accessing the Internet via more alternate platforms, making it difficult for the EU to close the gap on the US.

Progressive migration towards the IS, requires continued education and awareness raising

Migration from basic to more experienced users is obviously a significant dynamic in the Information Society. Not only does it enable Internet users to be more adept, but also it increases the propensity for the user to adopt broadband. Moreover, this migratory effect has important implications for the longer term vision of Europe. Greece and Portugal in particular, but also Spain, Italy and France lag behind the rest of Europe in many respects of eEurope. Fortunately, it appears that these member states are following this general migratory curve. However, it appears that pump priming initiatives, once infrastructure is in place, are required to educate late adopters and potential users. Education initiatives are still required as significant preconceptions still exist in many EU member states as to the skills required to be involved in ICTs – especially in Mediterranean countries. It is also the case that education initiatives need to be focussed on those citizens which may be marginalized across the socio-economic divide.

Enterprise access: some member states set the benchmark, but there are significant differences across size classes

In terms of enterprise access to the Internet, the EU appears to be making good progress with almost all businesses being online. Also, looking at how people use computers and Internet in their daily routine, the profile of users is encouraging, especially for those citizens that are self employed. Within the EU Nordic countries set the benchmark for enterprise access, surpassing the US, however on the whole the EU still lags behind. It was also found that SMEs still lag behind their larger counter parts when it comes to the Internet, email and extranet activities. Consequently, those countries with larger micro and small enterprises will naturally be behind those countries with larger enterprises (e.g. Denmark, Finland, & the UK). This picture is not consistent though, as interestingly analysis of SMEs within different economic activities showed access to vary greatly. Whilst it is acknowledged that existing European programmes have enabled progress, it may be that there is an inevitable lag time which needs to be monitored (identifying particular barriers for SMEs across certain industrial sectors – possibly requiring targeted intervention).

e-Government: convenience, location, and ease of use are the drivers, but raising awareness appears to be key

The analysis carried out in SIBIS gave valuable, complementary information about the demand side of e-government. Overall, the services which do not require users to reveal a great deal of personal information about themselves are more popular. This barrier, however, is not insurmountable if citizens can perceive real advantages in terms of convenience, saving of time and ease of use, as online tax declarations showed. For the more widespread use of e-Government, several perceptions and issues have to be addressed. In some nations this is cultural, in some cases it is based upon experience (non Nordic) and the reality of using e-government (the disappointment or frustration with the application), and in others it is expectation (in late adopting countries). In the main, it appeared that European citizens were not fully aware of the services available, and therefore awareness raising is still needed.

e-learning: under 25s lead digital literacy across the EU, with e varying degrees of proficiency in different Member States– but the benchmark (the US) is far from close

Across the EU, digital literacy has varying levels of proficiency. Within the student population the US sets the benchmark, but not by much. However, the general populations' digital literacy in the EU is almost a factor of two behind the US's. This is because there is a significant differential across member states, with a north south divide in existence. This divide is less accentuated for the under 25s, with the EU closing in on the US. Unfortunately though, the Digital Literacy divide is heightened across genders. This has implications for the eEurope's proposed action of improving the digital skill of women, especially for those returning to work.

e-learning work & skills: 1-in-4 participate in work related training, with 1-in-2 engaging in self-directed work-related training

By avoiding reliance on disparate national approaches, the SIBIS survey allowed a sound benchmarking of participation in work-related training. SIBIS results suggested that rates of participation are higher than have been estimated up to now and that commonly held perceptions of the relative performance of Member States may need to be somewhat revised. Overall, a little under one in four of the EU labour force reported participating in work-related training and almost twice this number reported engaging in self-directed work-related learning. Both figures are a lot lower than the corresponding US figures and only Finland reached the US benchmark for training, with only Finland and Germany exceeding the US levels for self-directed learning. Some countries, such as Portugal and Greece and, to a lesser extent, France are clearly lagging behind.

An inclusive knowledgeable IS is in the making, but certain groups could be left behind

Life-long learning, as well as being a cornerstone of producing a more flexible skilled workforce, has been shown to be a considerable factor in cultivating a knowledgeable Information Society. Unfortunately, life-long learning has mixed uptake in the EU, especially between the employed/un-employed. It is acknowledged that awareness raising programmes and incentives are currently part of educational and employment policies, but some member states still need to do more to raise the profile and targeting of such activities. The problem for those at the periphery (unemployed, retired etc.) appears to be accentuated by the type and amount of training programmes enterprises are engaging in, effectively producing a moving target for policy makers; requiring education initiatives to be stepped up if these groups are to be keep up with their employed peers.

e-health: the relevance of e-health is significant, with 1-in-10 Europeans seeking information to substantiate a medical diagnosis

Differing cultures and health care systems appear to differentiate e-health information seeking across the European countries. Nevertheless, it is an activity that is increasing in all countries, especially amongst the younger and middle age groups. But again, exclusion effects are felt across socio-economic divides because of the lower levels of Internet access of these groups. Also, because usage of online health services is affected by usage context (eHealth is something that people may wish to do in private), PIAPs may not be the answer to eHealth exclusion. Ongoing challenges for policy makers are related to these broader issues of access, but regulation of European health information sites is also becoming an increasing issue. There is also the challenge of regulating non-EU e-health based sites and services.

Dynamic business environment: 62% of Europe's enterprises purchase online – with MRO championing the cause

Whilst undoubtedly there is an emergence of a dynamic business environment, especially within some member states, the reality is still a low volume of online sales, in all guises (BtoB, BtoC, BtoG). Within BtoB, the provision of MRO services is championing the cause, relatively consistent across size classes and economic activities (EU 7 has 62% uptake). Unfortunately, many SMEs whilst appearing to procure online, are still not that active in selling online. A trend of more widespread BtoB trading appears to be limited to those sectors which are not capital intensive.

In BtoC, security fears, limited online tenure still appear to be stalling growth. Within BtoC the recurrent issue of socio-economic divide is still present, especially separating buyers across income and educational divides. Reasons for this could be more than solely related to socio-economics, it could be that the type of goods initially purchased online by intrepid users are not particularly suited to citizens in these socio-economic groups.

e-Business Readiness: e-documents are exchanged by over a third of enterprises, but more complex business interaction has a long way to go to the 2010 vision

In reviewing the e-business readiness of enterprises, it was found that whilst the more basic function of electronic exchange of documents had widespread use, more complex interaction, including planning, forecasting and inventory activities had a low uptake. With even less uptake, a picture emerged for more complex value chain activities, whilst some economic sectors (telecomm & computer services and financial services) displayed a propensity to adopt these applications, in the main they only had uptake of between 3 and 6%.

e-Business Readiness: enterprise and worker flexibility vary significantly across the EU

Within enterprises varying degrees of employment flexibility (home working etc.), and employment tenure are effecting job learning and ICT diffusion. The proportion of the workforce doing at least some home-based teleworking varies widely across the EU Member States, from a high of more than one in five in the Netherlands to a low of less than one in fifty in Portugal, with the US being more likely to do some form of home-based teleworking than their European counterparts. Also, the proportion of employees working at least one full day at home has risen little since 1999 and remains just over one in fifty of the workforce. This suggests that teleworking is not being widely used as a solution to work-life balance challenges or lifestyle aspirations, at least amongst employees. On the other hand, there has been significant growth in self-employed people working from a home-base with the support of ICTs (so-called SOHOs), rising from less than one in one hundred to almost one in thirty of the workforce between 1999 and 2002. In addition SIBIS found that more than 1-in-3 EU workers now engage in some form of tele-cooperation as part of their work practices. Although the rate in the US is significantly higher than for the EU overall, a number of EU countries (Denmark and Finland) are setting the international benchmarks with even higher rates of tele-co-operation than in the US. Those countries where these type of activities are less diffused are Portugal and Greece and, to a lesser degree, Spain and France.

e-security: privacy is still a major concern

SIBIS examined an array of e-security benchmarking indicators, providing interesting perspectives on the pervasiveness of security measures on infrastructure and culture. SIBIS found that citizens across the EU are strongly concerned both about privacy, confidentiality and about data security; although there is a slightly higher inclination to be concerned about privacy. SIBIS also found that the number of enterprises (those online) which suffered from security breaches correlated to the comprehensiveness of the security policies and infrastructure employed. In addition, the fact that, with the exception of virus infections, the number of breaches is fairly low suggests that implementing a security policy does work. Although on the other hand, the overwhelming presence of computer virus incidents (above 90% in European establishments) across the EU suggests the need for further action, for example in terms of training and awareness raising. Interestingly, SIBIS also showed that for individuals the ability to report anonymously only marginally affects the willingness to report an incident; in this respect individuals differed from enterprises - the latter preferring anonymity. Also, the role of anonymity in reporting incidents varied for different kinds of intrusions (viruses to unauthorised access etc.) and is an avenue of further exploration.

Broadband: uptake is growing, but more favourable economic incentives through increased competition are key

Broadband is a crucial element of eEurope. Europe still has a long way to go before it has comparable levels to the US. Nevertheless, increasing online tenure and more favourable tariffs and regulatory intervention against dominant incumbents are drastically increasing uptake. Whilst eEurope 2002 identified that the telecommunication infrastructure is in place, there are issues still to be overcome within the telecomm price structure within certain member states. The prime example was shown to be the UK which, through Oftel, introduced un-metered Internet access, leading to five million households taking up such services. As such, a new EU regulatory framework for electronic communications is a welcomed development for producing sustainable competitive markets, and for a greater introduction of Flat Rate Internet Access Costs (FRIACO) in countries where incumbents are not currently offering such retail packages.