e-business w@tch

ICT & e-Business in the

Telecommunications and
Computer Services Sector

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Introduction

European policy is, in a number of areas, including economic, innovation and SME policies, increasingly focused on promoting the business techniques and new ways of working which will provide the economic and social foundation of the information society in Europe. To help policy makers define their programmes, and to monitor the effectiveness of these policies, some indication of progress and of areas requiring active support is essential. At the same time, many areas of European business lack information about the speed of technological update in European markets, which they expect to have a strong impact on their global competitiveness.

Despite the increasing number of studies and market research projects from numerous international authors and research organisations on electronic business and especially on electronic commerce, there is still a lack of reliable empirical information on the factors affecting and the extent, scope, nature of the speed of e-business development in Europe at the sectoral level in an internationally comparative framework. This report aims to provide such information for the ICT services sector.

This report has been published in the framework of the "European e-Business Market Watch" (the "*e-Business W@tch*"). This is a market observatory established by the European Commission, DG Enterprise. Laying the groundwork for a continuous facility, the *e-Business W@tch* monitors and assesses the maturity of electronic business in 15 industry sectors across all EU Member States, including seven manufacturing and eight service sectors. At least two reports will be published on each sector during the 18-month life-time of the *e-Business W@tch*. The sectors and the publication schedule for these reports are as follows:

	Sector	1st Issue Report	2nd Issue Report
1	Food, beverages, tobacco	August 2002	January 2003
2	Publishing, printing and audio-visual services	October 2002	April 2003
3	Manufacture of chemicals and chemical products	August 2002	January 2003
4	Manufacture of Metal products	October 2002	April 2003
5	Manufacture of machinery and equipment	October 2002	April 2003
6	Manufacture of electrical machinery and electronics	October 2002	April 2003
7	Manufacture of transport equipment	August 2002	January 2003
8	Retail	October 2002	April 2003
9	Tourism	October 2002	April 2003
10	Credit institutions, investment firms, leasing enterprises	August 2002	January 2003
11	Insurance and pension funding services	August 2002	January 2003
12	Real estate activities	October 2002	April 2003
13	Business Services	October 2002	April 2003
14	Telecommunications and computer related services	August 2002	January 2003
15	Health and social work	August 2002	January 2003

The research presented in these Sector Reports is intended to help to benchmark progress and to assess how electronic business development can be further enhanced at the European level or at Member State level with the objective of strengthening the competitiveness of European businesses. While the main target of the first series of sector reports (published in August 2002) was to provide a thorough portrait of the background and challenges related to e-business in the sectors, this report focuses on presenting the results of a recent survey:

Most of the data presented in this report are based on the European e-Business Survey, a corner-stone of the monitoring activities of the *e-Business W@tch.* The fieldwork of this enterprise survey was carried out by INRA Germany GmbH in co-operation with its international partner organisations in June and July 2002 using computer-aided telephone interview (CATI) technology. The decision-maker in the enterprise targeted by the survey was normally the person responsible for ICT within the company, typically the IT manager. Alternatively, particularly in small enterprises without a separate IT unit, the managing director or owner was interviewed. In total, more than 9,200 interviews with decision-makers in European enterprises were conducted. The survey included all sectors and all Member States, but only in the four largest states (Germany, France, Italy and UK) were all sectors covered. The survey among enterprises in the ICT services sectors was carried out in the following six countries: Germany, France, Italy, the Netherlands, Finland and the UK.

Further methodological information is provided in the annex. More information about the *e-Business W@tch* in general is available at www.ebusiness-watch.org.

ICT Services:
Sector Profile & e-Business

1   Economic profile[1]

1.1   Definition and structure

1.1.1   Definition

This *e-Business W@tch* report analyses activities within the following classifications: telecommunications (NACE Rev. 1 64.2) as well as computer related activities (NACE Rev. 1 72). The latter can be subdivided on the 3-digit-level into six further groups. As all of these are concerned with service activities as well as the production of immaterial goods (software), we will also use the term "computer services" in this report to describe all activities within NACE 72.[2] For the combined sectors NACE 64.2 and 72 we will use the term "ICT services" for better readability, where ICT stands for information and communication technology. It has to be kept in mind, though, that ICT services can also be defined in a broader way, e.g. by also including wholesale of office machinery.[3]

Code	Activity
64.2	Telecommunications
72	Computer related activities
72.1	Hardware consultancy
72.2	Software consultancy and supply
72.3	Data processing
72.4	Database activities
72.5	Maintenance and repair of office, accounting and computing machinery
72.6	Other computer related activities

ICT services are an important part of the ICT sector, which is often defined as consisting of ICT manufacturing, ICT wholesale, telecommunications and computer related activities. The exact definition of "the" ICT sector, however, differs from study to study, depending on the statistical data available, the focus of the study as well as the motivation behind it.

Both sub-sectors analysed in this report, telecommunications as well as computer services, have one thing in common: While they are potential users of e-business, like every other industry – and only this aspect will be analysed in the *e-Business W@tch* – they also provide some of the most essential elements for conducting e-business. These are: firstly, the telecommunications infrastructure including the infrastructure for data traffic; secondly, software; and thirdly, consulting and outsourcing services. One could therefore assume that the companies in these industries are conducting e-business in the best way possible, as they are familiar with concept and technology, and as they should be competent in realising e-business projects.

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[1] This section provides a summary of the most important economic characteristics as well as current economic issues of the ICT services sector. A more detailed analysis can be found in the first report on this sector.

[2] When writing about the NACE classification, we always mean NACE Rev. 1.

[3] This is done, e.g. by Eurostat (cf. Deiss, 2001). The OECD in addition subsumes renting of office machinery and equipment (NACE 71.23) under ICT services. (OECD, 2000) It is, however, not always possible to distinguish between ICT and not-ICT related activities in renting and wholesale. For a further discussion of the different definitions see the first report on this sector.

1.1.2 Industry structure by sub-sector

The main division of ICT services according to the NACE classification is between telecommunication services and computer services, where the latter also includes software production.

Telecommunication services

Telecommunication services are much more than just telephone services. This sector embraces the distribution of data, sound, images, and other information via cable, broadcasting, relay or satellite. Included in this definition are the management and maintenance of networks as well as the provision of services using these networks. Excluded, however, is the provision of radio and television programmes (NACE 92.2).

Within the EU-10 countries for which recent data is available (see table 1-3 below), telecommunication services account for slightly more than half of the value added in the ICT services sector, for about a third of the employees in the combined sector but for only 3% of the enterprises. This already shows that production and size structure in telecommunication services differ significantly from that in computer services.

The telecommunication services sector has undergone dramatic changes in the last decade, mainly caused by deregulation and privatisation of formerly government-owned postal and telecommunication services conglomerates, but also by technological advances. Although this has led to a variety of new firm foundations, the sector is still characterized by a rather small number of large enterprises, many of them being parts of former state monopolies.

However, history is not the only explanation of the large size of telecommunications companies. Telecommunications is also an infrastructure-service, which involves the usage of large amounts of capital to set up telecommunication networks. Economies of scale are typically large in such industries, resulting in large entities.

Computer services

Computer services produce value added of a similar size as telecommunication services, but in a totally different way. The average enterprise is considerably smaller than in telecommunication services and production is significantly more labour-intensive. This explains why computer services companies employ about two thirds of all employees in the ICT services sector and make up around 97% of all enterprises in this sector.

A closer look at this sub-sector shows that section 72 of the NACE classification subsumes a variety of rather diverse activities related to ICT. Their common link is that they have (or at least had when this classification was created) more or less service character. The most important of these in terms of value added and employment are the sub-sectors software consultancy and supply (NACE 72.2) as well as data processing activities (NACE 72.3). Typically, these account for more than 80% of the values for the whole computer services sector.

One part of software consultancy and supply is software consultancy (NACE 72.22). Another part is the actual supply of software (NACE 72.21). This important part of the ICT sector is therefore more or less tucked away deep in the NACE classification. As most data is only available for higher aggregation levels, there is not much official data available on this sector.

While software production used to be mainly a service activity, where software was produced according to individual specification for each buyer, today it resembles more a product business. The outcome of the production process – often so-called standard software – is sold in similar ways as hardware and often via the same sales channels. While some software is used without modification, other software is customised to the needs of its buyers, which provides additional service income for the software manufacturers.

Data processing activities are typically called IT outsourcing in the industry, e.g. operation of computer centres for companies or hosting of applications and activities such as outsourced accounting or payroll services. Many computer services companies are active in several computer services areas. A

typical sales slogan of these companies is that they "plan, build and run". The planning part comprises all sorts of hardware and especially software consultancy services; the building part consists of programming individual software as well as integrating existing software components; and the running part is the actual operation of the created IT infrastructure.

According to estimates by EITO, software and services make up an important part of IT turnover in the European Union, and their importance is growing (see table 1-1[4]). They made up for roughly 54% of total IT turnover in 1998 and were estimated to reach a share of 58% in 2001. This makes IT software and services slightly more important than hardware sales.

Table 1-1: Total IT turnover in the EU

	Turnover (million Euro)			
	1998	**1999**	**2000**	**2001**
IT hardware	86,405	92,937	99,425	105,865
Software	36,283	41,150	46,928	53,666
Application software	18,529	20,974	23,928	27,313
System software	17,754	20,176	22,939	26,353
Services	64,152	72,988	82,386	91,851
Consulting	6,549	7,660	8,946	10,401
Implementation	21,198	25,045	28,940	33,118
Operations management	21,689	24,642	27,894	30,872
Support services	14,716	15,642	16,606	17,460
Total	186,840	207,075	228,739	251,282
Source: EITO according to Eurostat (2001)				

1.1.3   Industry structure by size

Table 1-2 illustrates the significant differences between telecommunications and computer services companies mentioned above. While in telecommunication services more than 90% of the employees work in large enterprises that generate over 90% of the sector's total turnover, in computer services almost three quarter of the employees work in SMEs, which produce about two thirds of this sub-sectors' total turnover.

Table 1-2: Size class distribution in ICT services

	Enterprises with … persons employed…			
… constitute	**0-9**	**10-49**	**50-249**	**250 and more**
Telecommunication services				
Enterprises[1]	88.8%	8.9%	1.6%	0.7%
Turnover[2]	1.6%	2.2%	3.0%	93.2%
Employment[2]	2.3%	2.8%	2.4%	92.5%
Computer services				
Enterprises[1]	92.7%	5.9%	1.1%	0.2%
Turnover[1]	21.7%	21.0%	24.6%	32.7%
Employment[1]	29.8%	22.0%	21.1%	27.1%
1) EU-7: A, B, E, F, I, FIN, SE				
2) EU-4: B, E, F, I, FIN				
Source: Eurostat New Cronos, SIZCLA, DIW estimates. Values are for 1999.				

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[4] These values are not directly comparable to those compiled in other tables in this report and to NACE, as EITO uses different definitions of the IT sector and its sub-sectors.

Both sub-sectors differ from most "traditional" service activities. As already mentioned, telecommunication services are to a large extent utilities that require large amounts of capital and a relatively small amount of labour for production.

Computer services, on the contrary, seem to have an untypically small size range where production is optimal. On one hand, according to Eurostat (2001), the share of computer services companies without employees is relatively small. In 1996, 40% of European enterprises in this sector had no employees, whereas such companies make up the majority of enterprises in other service activities (from NACE G and K). On the other hand, the share of companies with 1-9 employees was relatively large (54%). Thus there are more small businesses with few employees than one-(wo)man shows in computer services. In addition, large companies in computer services are smaller than large companies in other service sectors. While those with 250 or more employees had on average 637 persons on their payroll, this number was 1,300 for services in general (NACE G and K). The same applies to turnover, where large computer services companies billed on average 72 million Euro, while large services companies in general had a turnover of 316 million Euro per year.

1.2 Economic situation and key findings[5]

1.2.1 Production, employment, and integration into world economy

Table 1-3: Industry structure by sub-sector, 1999

Country	Telecommunications			Computer services		
	Value added (m Euro)	Number of Enterprises	Employees (1000)	Value added (m Euro)	Number of Enterprises	Employees (1000)
Austria	2,555	186	24.4	1,562	6,425	27.7
Belgium	3,744	315	31.0	2,348	6,479	39.5
Denmark	2,330	245	20.5	2,122	5,221	34.7
Finland	1,886	224	19.4	1,480	3,535	25.5
France	-	2,362	-	15,387	31,285	262.1
Germany[1]	29,099	551	221.4	27,229	46,544	349.0
Italy	14,441	583	105.3	9,939	69,515	263.7
Luxembourg	567	46	0.9	196	611	3.4
Netherlands	-	830	49.6	-	-	-
Portugal	2,514	149	21.2	595	2,280	15.0
Spain	7,455	1,040	74.4	3,599	17,702	113.3
Sweden	-	280	-	4,977	19,045	86.7
UK	26,402	5,946	230.1	33,945	124,501	507.2
EU-10[2]	90,993	9,285	748.7	83,016	282,813	1379.0

Source: Eurostat New Cronos, SBS, Enter-L.
No data available for Greece and Ireland.
1) Employment data from RegTP (2001), p.6 per 31.12.1999.
2) EU-10: A, B, DK, FIN, D, I, L, P, E, UK

Production

In 1999, the European telecommunications companies in those ten countries for which data is available created a value added of 91 billion Euro (see table 1-3). The large member countries

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[5] A more detailed presentation of the sector's economic situation can be found in the first *e-Business W@tch* report on the ICT services sector as well as in the literature mentioned therein.

Germany, Italy and UK in this group are responsible for almost 77% of the combined value added in the EU-10. Within computer services, the same ten countries created value of 83 billion Euro, where Germany, Italy and UK accounted for 86%.

These figures for value added make the sector relatively small in comparison to the remainder of the economy. In Germany, for example, value added at market prices in the telecommunication sector corresponded to only 3.5% of total value added in services. For computer services, this value was even lower, at 2.2%.[6] Thus, the importance of the ICT services sector stems rather from its fundamental role in providing the basic infrastructure for the information economy and from its strong growth than from its current size.

Employment

The computer services sector employs more people in most member countries than the telecommunications services sector. However, the size of each of the two sectors measured by the number of employees differs considerably among member states and does not correspond tightly to the countries' size. The computer services sector in the UK, for example, is considerably larger than Germany's, despite the latter's larger economy. The same can be observed for telecommunications.

ICT services are of almost negligible importance with respect to employment. In 1999, the shares of computer services employment in total service sector employment were between 0.7% and 1.2% in the EU member countries. Finland, UK, Belgium and Denmark showed the highest importance of computer services with employment shares above 1%. In comparison, Luxembourg only showed a share of 0.7%. The importance of telecommunications for employment is even lower on average.

Integration into world economy

Within ICT services, the integration into the world economy is stronger for telecommunications than for computer services. With increasing international business relationships and falling prices for international phone calls and data transfers, the international use of telecommunication services is growing. According to Eurostat (2001), the number of outgoing international calls from the EU-15 countries alone rose from 10.6 billion in 1988 to 23.2 billion in 1996. This growth continued: 35.8 billion minutes of international phone calls originated in the EU-15 countries in 1999, 58% more than just two years earlier. As each international call or data transfer requires termination in the country called and possibly transfer services on its way to the person called, it is an export of telecommunication services from the point of view of the country called.

Depending on the characteristics of each country, the volume of international trade in telecommunic-ation services differs. Within the EU-11[7] import penetration ratios, defined as imports in relation to the sum of imports and production, are high in Sweden, Belgium and the Netherlands and relatively low in France, Italy and Spain. These countries also show correspondingly high and low export ratios, defined as exports in relation to domestic production. Thus, import penetration or export ratio alone is more a measure for the integration of a country's telecommunication network in the world's telecom infrastructure than a measure of export success or substitution of domestic products by imports. In this way telecommunications as an infrastructure service industry differs from traditional product industries.

Import penetration ratio and export ratios for other ICT services are lower than for telecommunications in most countries. Just like telecommunication services, other ICT services also show a positive correlation between import penetration and export ratio. Within the EU-11, both values are highest in Finland and the Netherlands.

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[6] Statistisches Bundesamt (2002), p. 639.

[7] A, B, FIN, F, D, I, NL, P, E, SE, UK. From OECD (2000). "Other ICT services" follow the OECD definition and include in addition to computer services wholesale of ICT as well as renting of office machinery.

1.2.2 Workforce and productivity

Workforce characteristics

Unit personnel costs in both sectors were relatively high in 1997 according to Eurostat (2001), which estimated the EU average at almost 43,000 Euro per employee for telecommunications and 40,000 Euro per employee for computer services.[8] For computer services, education levels are also reported: more than 54% of employees had completed a university degree or had an equivalent education, which is a higher than average share.

More detailed data is available for the Nordic countries Denmark, Finland, Iceland, Norway, and Sweden, for which a joint working group of the statistical offices has compiled some ICT sector related statistics (Statistics Denmark et al., 2001). These data show rather high shares of employees with third-level education in ICT consulting, ranging from 56% in Norway to 61% in Sweden. In telecommunications, the share of higher educated employees is lower, and the cross-country variance higher.

The age characteristics differ between the two parts of ICT services as well. They only partially confirm the prejudice of a sector primarily characterised by young employees. In the telecommunications sector of the Nordic countries the share of employees younger than 35 is only 36%. ICT consulting, however, is far more characterised by young workers. Their share is at 49% in the Nordic countries, rising to 56% in Iceland.

ICT service activities are characterised by an unusually high percentage of male employees, especially when taking into account the high labour force participation rates in Scandinavia. ICT services (including wholesale of ICT products) employ only 29% females, whereas this fraction is 43% in total services. Working in this field therefore seems primarily to attract men.

This measure confirms the difference between telecommunications and ICT services. Telecommunications is again much closer to the overall average, showing percentages of female workers of 38%. ICT consulting, however, is again dominated by males: Only 27% of employees are female in the Nordic countries, where the country-specific shares range from 25% in Denmark to 27% in Iceland, Norway and Sweden to 30% in Finland.

Productivity

Productivity, measured as output per employee, differs significantly between telecommunications and computer services. Turnover as well as value added per person employed are considerably smaller in the computer services sector. While in telecommunication services value added per employee in the EU-10 countries is at 116,000 Euro (see table 1-3), the same value for computer services is only at 60,000 Euro. This is the outcome one would expect, given the high capital intensity of telecommunications and the fact that these quantities only measure labour productivity and not total factor productivity.

These different capital intensities are also reflected in investment data. Depending on country, aggregate investment in telecommunications is between 4 and 14 times as large as in the computer services sector. This clearly shows the different natures of service production in the two sub-sectors. While the first is an infrastructure business requiring high capital intensity, the second is a rather classical service business.

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[8] Estimations did not include DK, D, EL, E, NL for computer services and D, EL, E, IRL, L, NL, UK for telecommunications.

1.2.3 Growth dynamics

Telecommunication and computer services both showed a picture of healthy growth of production in the second half of the 1990s, for which data for several EU countries are available (see figure 1-1). This growth was well above GDP growth, implying an increasing importance of both sub-sectors for most European countries. Although growth between both sub-sectors was in sync in the first half of the observation period, growth in computer services accelerated in 1997/98. This marks the beginning of the Internet and e-commerce bubble.

Figure 1-1: Share of enterprises with turnover growth in last fiscal year
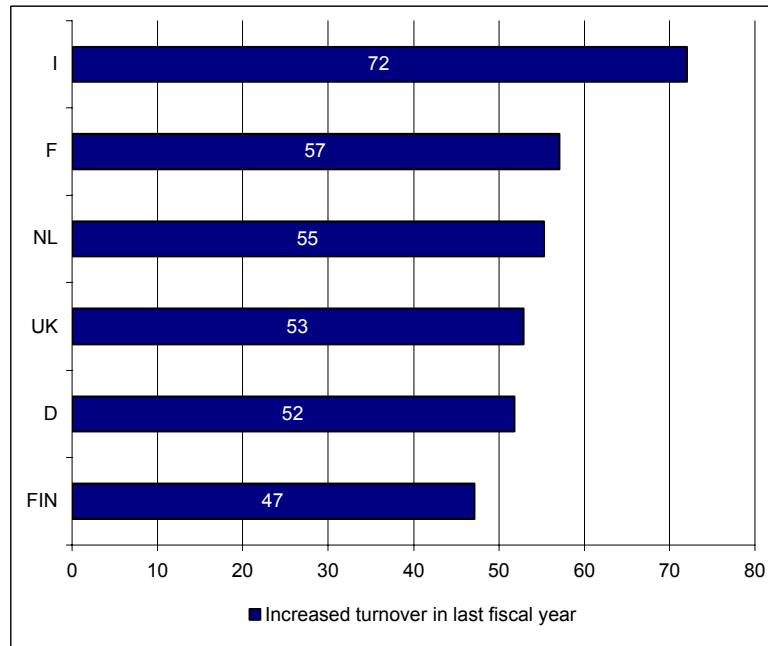
Source: e-Business W@tch (2002)

Despite the e-business downturn slightly more than half of the enterprises in the ICT services sector that have been surveyed by the *e-Business W@tch* have experienced an increase in turnover in their last fiscal year. While this seems to indicate reasonable growth at first sight, it is most likely a much smaller fraction now than it used to be one or two years ago.

The labour force development in the second half of the 1990s also differed clearly between the two sub-sectors. In telecommunications, the number of employees fell in the wake of deregulation and only increased slightly afterwards. However, for the EU-7 countries depicted in figure 1-3, employment fell by only 14% from peak to trough, which is a small fall compared to the increase in employment in computer services.[9]

In comparison, the number of employees in the computer services sector rose continuously over the last years in all member countries. As computer services are to a large extent traditional service activities with high labour intensity and low possibilities to substitute labour through capital, the increase in demand for computer services and software during the last years also required an extension of the labour force. In the EU-11 countries depicted in figure 1-3, this sub-sector's employment rose by 60% in the second half of the 1990s. This increase dwarfs the changes in telecommunication services employment and more than compensates for job losses in telecommunications.

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[9] These time series should be interpreted with care, though, due to the statistical offices' differing ways of handling the former state monopolies in the second half of the 1990s.

Figure 1-2: Employment growth in ICT services, EU-7/11, 1995-99
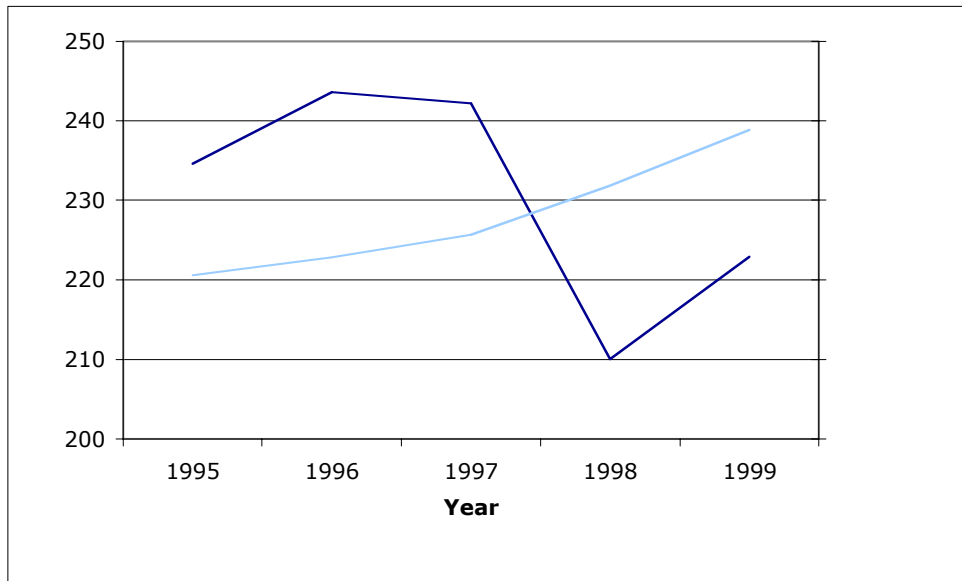
Telecommunication services values are for EU-7: B, DK, I, L, A, P, FIN
Computer services values are for EU-11: B, E, F, IRL, I, L, NL, A, P, FIN, SE
Source: Eurostat New Cronos, production value at constant prices, latest available data.

1.3   General trends and business issues

The ICT services industries are among the most dynamic industries in Europe's economies and belong to the core industries for the e-business revolution. They have been characterised by substantial changes during the last decade, which brought a variety of challenges for the companies. These differ between telecommunication services companies and the computer services industry.

Telecommunication services

Telecommunication services have changed considerably during the previous years, bringing new sector-specific issues and challenges to companies. We have identified six major issues that we regard as important for past, present and near future:

- Liberalisation of telecommunication markets and the resulting increase in competition;
- Regulatory disputes involving former monopolies;
- Development of the demand for mobile communication;
- Expectations about the future demand for telecommunication services, especially in the mobile area;
- Growth of data traffic on telecommunication networks; and
- New technologies for network access as well as network administration.

Liberalisation was a major force in Europe in the late 1990s. Typically, the former state monopolist now has competition, at least in some markets, and the sudden increase in competition has led to a rapid fall in prices, also for the incumbents' telephone services. However, the new competitors have been only partially successful, due to weaker than expected demand and due to interconnection disputes with incumbents. Such disputes about access to essential facilities of the incumbents as well as about the pricing of this access have been background noise for the telecommunication industry since its liberalisation.

A further major issue has been - and still is - cellular digital telephony. With the acceptance of the GSM standard by all European telephone operators and the awarding of frequency spectrum in all countries, an increasing number of companies offered wireless phone services and the number of mobile phone users increased considerably. Recently, this success story has lost some of its former appeal. The average revenue per user (ARPU) has fallen significantly, as mobile users with lower usage have become customers, as prices for mobile phone calls have fallen and as operators have considerably subsidised phones to win new customers. At the same time, costs for running the phone network have remained constant or even increased, putting significant pressure on margins. High bets have also been placed on the success of the so-called third generation wireless technology UMTS. With operators and commentators now being more cautious again, the general feeling prevails that the prices paid for the spectrum licences were too high.

A third major trend is the rising importance of data traffic induced by the increasing popularity and usage of the Internet. The latter fuelled demand for Internet access services as well as for Internet backbone services. It was expected that data would quickly overtake voice as the main source of traffic on global telecommunication networks. However, despite the increasing demand, considerable overcapacity for backbone services has been built up. This capacity, which was more than needed, is to a large extent unused by now, and is putting pressure on prices for backbone services.

Finally, new technologies have considerably influenced telecommunication services and have opened up new opportunities for e-business. One of these technologies is broadband Internet access, loosely defined as access rates significantly higher than ISDN or analogue modem. Cable modems as well as xDSL offer the potential for new bandwidth-intensive services such as streaming media. The rollout of these services by established telecommunications companies as well as by new entrants has been slower than expected, though, not last due to a variety of technical difficulties.

Another group of new technologies relate to the telecommunication network itself as well as to its administration. The early telecommunication network was based on analogue technology and had several inflexible components installed, e.g. for billing the "voice minutes". Operators have digitised their networks in the 1990s to a large extent, which made additional services possible (e.g. simple forwarding of phone calls, calling line identification) and allowed an increased flexibility for billing. These intelligent networks are also the foundation for much of the customer-focused e-business in the telecommunication services industry.

Computer services

Within the computer services sectors we consider the following issues especially important for past, present and near future. Some are of larger importance for the software business, others for the consulting or outsourcing business.

- New forms of software delivery and software services enabled by the Internet;
- Application Service Providing;
- Demand for e-business related software;
- The spread of Open Source software;
- Legal issues concerned with the protection of intellectual property rights of digital goods and software patents;
- Demand fluctuations for ICT consulting services;
- New technologies for knowledge management and coordination;
- An increasing demand for outsourcing of ICT services.

Many of the issues faced by the software industry are directly related to the Internet and the possibilities it enabled. First of all, the Internet made new forms of software delivery possible. Downloads have become an alternative to physical software distribution, saving distribution costs and increasing customer satisfaction through immediate delivery. The Internet also offers an opportunity for customer care in the form of software updates — much software has been Internet-enabled during

the last years and can search on dedicated servers for updates or bug fixes, download and install them. In that way, the "product" software is increasingly supplemented with service elements.

This service idea is even more apparent in the concept of application service providing, which came up in the late 1990s. Application service providers (ASPs) offer software functionality in a one-to-many model via the Internet. The idea is that the user neither has to buy a software licence nor has to install the software, but can simply use a web browser to use the software and will be billed according to usage. While interesting in theory, demand for such services has been rather flat until now, partly because the ASPs could not yet really prove that their model was superior to traditional software use (cf. Berlecon Research, 2001).

A further issue is the increasing demand for e-business-related software. E-business software solutions, mostly sold to companies, are supposed to enable all sorts of Internet-related activities. Much of the software is still relatively new and at a relatively early development stage, especially if compared to established software such as spreadsheets or other forms of traditional enterprise planning software.

Another major sector-specific issue is the Open Source phenomenon, which became popular through operating systems such as Linux and through Internet software like the Apache web server. This software can be read, compiled and modified by everybody, subject to certain conditions. It is usually made available for free via the Internet and coded by groups of volunteers, which coordinate their activities over the Internet. Open Source software is increasingly becoming a serious competition for proprietary software in several markets.

The software industry has also discussed two related legal questions very intensely. The first is the question of intellectual property rights protection, as the easy international exchange of software over the Internet made copyright infringement easier, leading to an alleged increase in software piracy. The second, somehow related, question concerned software patents. While most forms of software were originally only protected by copyright, industry advocates in Europe called for the broader protection of software by patents.

Within the IT consulting business, a major challenge was the rapidly increasing demand for e-business related consulting and integration services and is now the subsequent sudden fall in demand. The bursting of the dotcom bubble has revealed overcapacities in many consultancies, which now have to adapt to the lower level of business activity without demoralising their remaining staff.

Other challenges for this industry are related to the new technologies for e-business and the complexity of e-business projects. The former requires considerable education efforts within the consultancies and has often led to a specialisation on the products of few software manufacturers. The increasing complexity required that consultancies are able to cooperate with freelancers as well as with other consultancies to manage larger projects. Technological support for managing such large and diverse groups of knowledge workers also became necessary.

The outsourcing industry (part of NACE 72.3, data processing) has also seen an increasing demand recently. Firstly, the management strategy of focusing on core competencies led many companies to outsource those parts of their IT infrastructure that they considered as not being of strategic importance. And secondly, the Internet reduced the costs of some sorts of outsourcing, especially for smaller projects.

2 Usage of ICT & e-business

In the following chapter, the usage of ICT and e-business in the ICT services sector is analysed on the basis of a survey conducted among 567 companies from 6 European countries. The survey was conducted between June and July 2002. The analysis focuses, firstly, on the specifics of the ICT services sector as compared to EU averages and, secondly, on differences between smaller and larger companies within the sector. As with any statistics, generalisation is one of the major caveats here. It has been indicated in the first section of this report that significant differences between telecommunications and computer services companies exist. While, for example, more than 90% of employees in telecommunication services work in large enterprises, almost three quarter of employees in computer services work in SMEs.

Accordingly, drivers and inhibitors for e-business, usage patterns, as well as the impacts of e-business vary significantly. Although there are some common elements, the different services, processes, value chains, typical company sizes and numbers of customers lead to different driving factors. For a small IT consulting company, for example, selling its services via the Internet (in the sense of completing sales transactions) often does not make sense; for an equally small standard software company it often does.

While survey results allow an analysis of differences between company size class, they do not allow for the distinction between different sub-sectors. As a result, we can only make, qualitative statements on the usage of ICT and e-business in the various sub-sectors. A number of methodological limitations have also to be kept in mind:

- Complete data sets are only available for EU-4 (Germany, France, Italy, UK), so comparisons to cross-sector averages are therefore based on EU-4 data. To give an indication about regional differences, though, a number of cross-country comparisons are provided. When comparing different countries it has to be kept in mind that the size of each of the two sub-sectors, measured by the number of employees, differs considerably among member states and does not correspond exactly to the countries' size. The computer services sector in the UK, for example, is considerably larger than Germany's, despite the latter's larger economy. The same can be observed for telecommunications.

- The composition of enterprises is different in different size classes. E.g., those sub-sectors where enterprises are typically very small (computer services) have a larger weight in size class '0-49 employees' than those sub-sectors with predominantly large enterprises (telecommunication services).

- Data are available in employment-weighted and enterprise-weighted form. While enterprise-weighted data are somewhat biased towards small firms, a more precise picture about what enter-prises regard as important is given. Employment-weighted data are more biased towards large firms, but are used when employee-oriented indicators are analysed. In the following analysis employment-weighted values are used in section 2.2, and company-weighted values in the remaining sections.

2.1 The role of ICT and e-business

Telecommunications as well as computer services have one thing in common: while they are potential users of e-business they also provide three of the most essential elements for conducting e-business. These are: the telecommunications infrastructure (also for data traffic), software, and consulting and outsourcing services. In the first *e-Business W@tch* report on ICT services, we have raised the hypothesis that companies in this sector might be already sophisticated users of e-business as they are familiar with concepts and technologies and are competent in realising e-business projects.

Table 2-1: General importance of e-business

Importance of e-business for the way the company operates today	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
Significant	12.2	26.5	26.5	28.8	27.8
Some	36.3	52.0	52.0	49.6	38.2
No role	48.4	18.7	18.7	20.3	34.0
No significant role today but expected in the future	25.4	39.3	39.5	20.2	33.3
No significant role today nor in the future	55.0	29.0	28.7	46.8	36.7
Note: enterprise-weighted, i.e. figures should be read as "% enterprises reporting…". Computation base: all enterprises. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

E-business plays an above average role for the ICT services sector. Almost 80% of the respondents of the *e-Business W@tch* state that e-business constitutes a significant or some part of the way their company operates today. On average over all sectors this share is below 50%. For only one fifth of all companies in the ICT services sector e-business does not play any role, compared to almost half of all companies in the EU-4 economy. Similarly, the share of e-business sceptics, i.e. those companies for which e-business does not play a significant role today and is also not expected to do so in the future, is only 29% in the ICT services sector compared to 55% on average.

Contrary to the overall economy, where e-business is least important for small enterprises, e-business seems to be especially important for small enterprises in the ICT services sector. Only 19% of the small companies do not ascribe any role to e-business but 34% of the large ones do. The share of e-business sceptics is also lowest in the small enterprise segment. The highest number of e-business sceptics can be found in the medium-sized segment: 47% of them do not see a significant role for e-business today or in the future, while the same is true for 37% of the large and only 29% of the small enterprises.

Figure 2-1: Role of e-business for company across countries (in % of all enterprises)
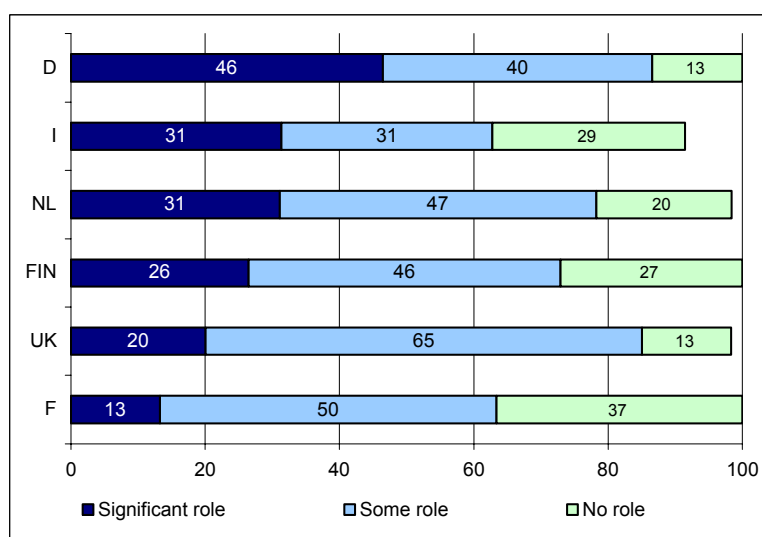
Source: e-Business W@tch (2002)

Figure 2-2: E-business sceptics* across countries (in % of all enterprises)
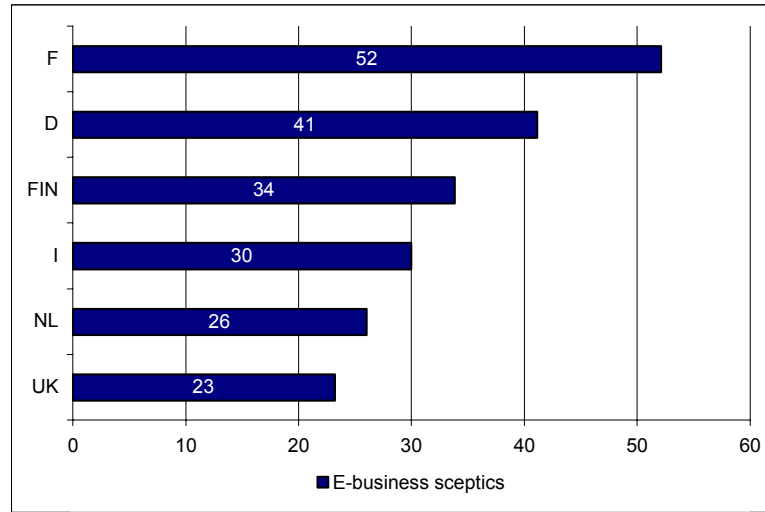
**companies saying that e-business does not constitute a significant part of their operations today
nor will do so within the next 2 years*
Source: e-Business W@tch (2002)

Comparing the role of e-business in different countries for which data is available shows that French ICT services companies are most sceptical about e-business (see figures 2-1 and 2-2). In Germany the share of companies that see a significant role of e-business is the highest of all countries for which data is available. At the same time, 41% of the remaining enterprises does not believe e-business will gain significant importance in the future.

Table 2-2: Impact of e-business on organisation

E-business has significantly changed …	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
the organisational structure	6.1	10.4	10.4	8.4	21.0
internal work processes	9.7	13.7	13.7	10.9	14.5
relationships to customers	8.0	12.5	12.5	11.4	13.3
relationships to suppliers	6.8	15.4	15.5	6.2	8.9
the offers of products and services	7.4	13.0	12.9	21.2	28.5
the way of conducting business	8.4	16.8	16.8	15.6	16.9
Note: enterprise-weighted, i.e. figures should be read as "% enterprises reporting…". Computation base: all enterprises. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

Table 2-2 further supports the picture of a sector for which e-business plays a comparatively important role. At 17% the share of companies which state that e-business has significantly changed the way of conducting business is twice as high as on average. This is equally true for small and large companies. Overall, two thirds of the companies from the ICT services sector but only one third of all companies in the EU-4 report that e-business has significantly or somewhat changed their way of conducting business. The impacts in all areas that have been surveyed are considerably stronger than on cross-sector average.

The survey results also show that in the ICT services sector the impact of e-business on various areas of the enterprise depends very much on the size of the company. The most significant impact of e-business in large companies is on the offers of products and services and on the organisational

structure. Large telcos, for example, are able to provide entirely new services, e.g. wireless data services. Similarly, large IT services companies now offer new concepts such as application service providing. In addition, large enterprises can use the new technologies to overcome organisational inefficiencies, which are typical in large entities.

In small companies, the most significant impact of e-business is reported on the relationship to suppliers and on internal work processes. Paperless processing of information associated with e-business, for example, allows SMEs to speed up internal processes.

Table 2-3: Perceived beneficiaries of e-business

| Most likely to benefit from e-business:	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
SMEs	12.7	15.5	15.5	16.2	11.2
Large enterprises	45.1	30.3	30.3	26.9	43.8
Equal	34.2	46.5	46.5	50.7	32.8
No one	1.7	3.1	3.1	2.7	5.7
Note: enterprise-weighted, i.e. figures should be read as "% enterprises reporting…". Computation base: all enterprises. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

While on average over all sectors large enterprises are perceived to be the main beneficiaries of e-business, nearly half of all companies in the ICT services sector believe that large and small enterprises can equally benefit from e-business (see table 2-3). However, one third of the ICT services companies still believe that large enterprises are most likely to benefit — the large companies themselves particularly think so.

Table 2-4: Satisfaction with the effects and success of e-business
(% of companies doing e-business[10])

Satisfaction with e-business	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
Very satisfied	13.6	17.3	17.2	17.3	24.5
Fairly satisfied	73.8	69.7	69.8	66.2	57.9
Fairly disappointed	11.9	13.0	13.0	15.6	14.4
Very disappointed	0.6	0.0	0.0	0.9	3.2
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises reporting…". Computation base: enterprises doing e-business (excl. DK/NA). Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

Of those companies for which e-business already plays some or a significant role, almost 90% are fairly or very satisfied with it (see table 2-4). This result is broadly in line with the average. However, the share of companies that are *very* satisfied with the effects and success of e-business is above cross-sector average in the ICT services sector. Large ICT services companies are most satisfied.

Countries in which ICT services firms are most satisfied with the effects and success of e-business are the UK and Finland, while in Italy only 7% are very satisfied and 61% fairly satisfied with e-business.

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[10] Companies reporting that e-business constitutes some or a significant part of the way they operate today.

Figure 2-3: Satisfaction with e-business across countries (in % of enterprises doing e-business)
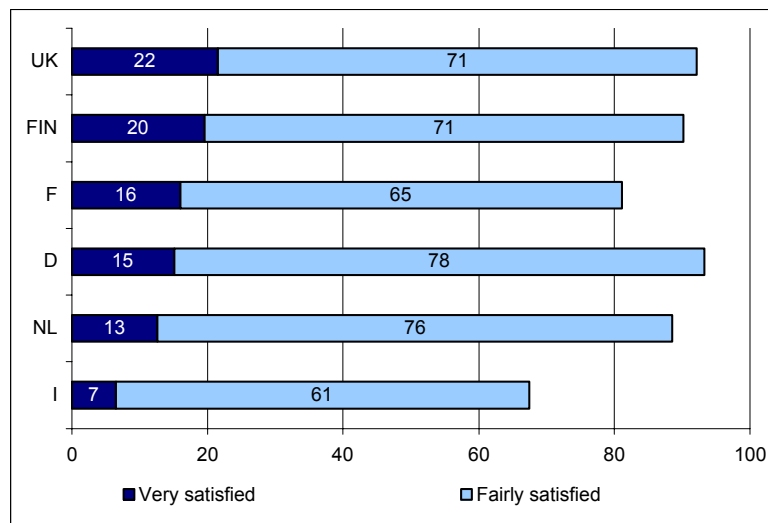
Source: e-Business W@tch (2002)

Table 2-5: Expenditure on e-business technologies within the next 12 months

Expenditure on e-business	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
Increasing	29.7	45.1	45.1	40.9	48.2
Decreasing	2.2	1.5	1.5	3.8	0.0
Current level	62.5	51.1	51.2	51.5	48.2
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises reporting…". Computation base: all enterprises (excl. DK/NA). Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

The above-average importance of e-business for ICT services firms is further confirmed by the companies' future plans to invest in e-business technologies (see table 2-5). At 45% a much higher share of companies than on average plans to increase their e-business expenditure within the next 12 months. However, more than half of all companies in the sector still want to leave their respective budget at the current level (compared to two thirds on average over all sectors). No major differences can be observed between large and small companies – in the medium sized segment, though, only 41% of the companies want to increase their e-business expenditure and almost 4% even want to decrease it.

No major differences can be observed for Italy, the UK, the Netherlands and Finland (see figure 2-4). Even though companies in Italy are least satisfied with the effects and success of e-business (compare figure 2-3), Italy shows the highest share of ICT service providers that plan to increase their e-business expenditure within the next 12 months. In France and Germany, a below average share of companies plan to increase their e-business budget.

Figure 2-4: Planned expenditure on e-business technologies across countries (in % of all enterprises)
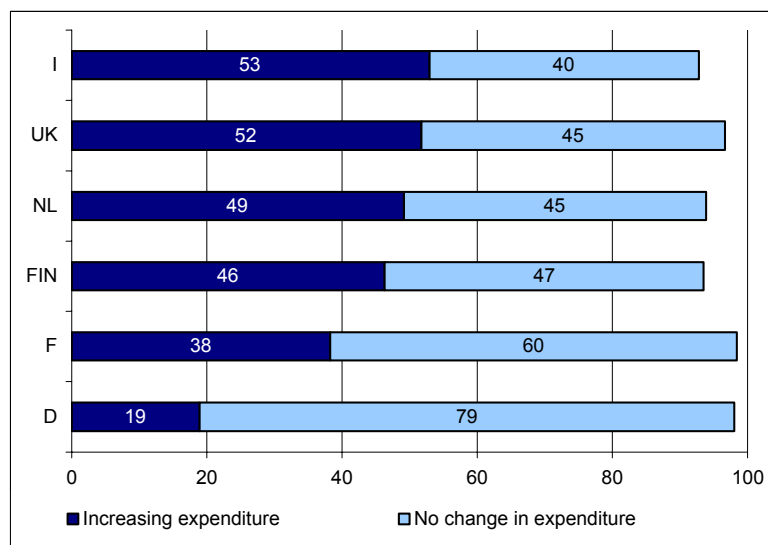
Source: e-Business W@tch (2002)

2.2   Readiness and Infrastructure

2.2.1   IT infrastructure

As one would expect in a sector that focuses on information and communication technologies, the survey results presented in the following section show that ICT services companies are indeed noticeably better equipped with IT infrastructure than the average EU-4 company.

Naturally, all companies in the sector use computers and the share of employees that work with computers is significantly higher than on average: 97% compared to only 57% on average.

The Internet, e-mail and the WWW are standard tools used in every ICT services firm, regardless of its size. Those features are available to the majority of office workers in more than 90% of all companies (see table 2-6). One exception is the use of e-mail for internal communication, which is somewhat limited in a number of small companies that obviously do not need to employ technologies for internal communication.

Figure 2-5: Average percentage of employees working with computers

	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
Availability of computers	97.0	100.0	100.0	100.0	100.0
% of employees working with computers	57.2	91.5	89.3	94.8	91.9
Note: employment-weighted, i.e. figures should be read as "% of employees working in enterprises with…". Computation base: enterprises with Internet access. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

Table 2-6: Facilities available to the majority of office workers

The majority of office workers has access to…	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
e-mail for internal communication	67.1	93.1	84.1	96.0	95.7
e-mail for external comm.	73.9	94.6	96.0	95.5	94.1
the WWW	63.3	91.6	91.9	92.9	91.3
the intranet	44.4	82.5	54.3	86.3	91.4
Note: employment-weighted, i.e. figures should be read as "% of employees working in enterprises where…". Computation base: all enterprises. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

Overall, the use of intra- and extranets is clearly above average in the sector as well. However, both are more often implemented in large than in small and medium sized companies. Intranets allow users inside the company to communicate and exchange information and are therefore often less needed in smaller companies where direct communication between employees is possible. The gap between large and small enterprises in the use of extranets is even more pronounced. Since extranets greatly enhance business-to-business communications, large companies particularly use them to enable their business partners access to data and resources (see case study Alcatel below).

> ***Alcatel generates more than 98% of its enterprise solutions sales from its extranet e-business platform***
>
> Alcatel designs, develops and builds communications networks, enabling carriers, service providers and enterprises to deliver any type of content, such as voice, data and multimedia, to any type of consumer, anywhere in the world.
>
> 18 months after implementation of its e-business platform, Alcatel announced in May 2002 that its extranet, sales and consultancy tool currently accounts for 98% of its catalogue orders. The e-business platform provides Alcatel's business partners with marketing tools and sales monitoring from supply chain to after-sales technical support.
>
> As a result of this new platform, Alcatel's partners, which have a presence in more than 100 countries, have personalised access to orders, marketing and online services. They are able to place their orders via Internet, and are assured of computerised monitoring of each stage of the sales process. They can also use content made available to them by Alcatel to facilitate their sales approach and technique.
>
> Once the user profiles (country, competencies, products researched ...) have been parameterised on the extranet site, they are filed, and operate dynamically: whether operating in the sales, marketing or technical divisions, customers have continuous round the clock access to all information authorised for their use.
>
> The architecture allows users to efficiently monitor orders, from validation of technical features to final invoicing, including price-setting and logistics management.
>
> Source: www.alcatel.com

96% of the employees in the ICT services sector work in companies that have a local area network (LAN) implemented, compared to only 66% on average (see table 2-7). A LAN connects several computers within a building and allows its users to send or receive files and to share access to files and data. The differences in the usage of LANs between large and small companies reflect that a LAN might not be necessary or make economic sense for very small companies, but is an absolute must for larger ICT services companies. Similarly, wide area networks (WANs) that connect computers over long distances are used by twice as many companies in the ICT services sector than on average over all sectors. The share is significantly higher in large companies, since WANs primarily connect different offices of regionally spread companies.

Table 2-7: Current and planned IT infrastructure

IT infrastructure	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
Internet					
- Current	90.9	98.8	99.6	100.0	98.3
- Planned	2.9	0.0	0.0	0.0	0.0
E-mail					
- Current	87.4	98.5	98.6	100.0	98.3
- Planned	0.6	0.1	0.4	0.0	0.0
WWW					
- Current	84.4	97.6	95.0	99.0	98.3
- Planned	1.3	0.1	0.6	0.0	0.0
Intranet					
- Current	51	85.3	58.1	88.2	94.1
- Planned	7.7	3.7	5.0	3.0	3.3
Extranet					
- Current	19.5	54.3	23.8	56.3	64.3
- Planned	7.7	7.8	7.3	9.1	7.9
LAN					
- Current	66.5	95.8	82.9	96.3	100.0
- Planned	1.8	0.5	1.9	0.8	0.0
WAN					
- Current	34.1	72.6	26.8	64.2	88.8
- Planned	3.6	1.1	4.0	1.9	0.0
Use of an ASP					
- Current	13.3	33.6	24.9	23.5	37.6
- Planned	2.5	2.0	2.2	4.3	1.7
Note: employment-weighted, i.e. figures should be read as "% of employees working in enterprises with…". Computation base: all enterprises. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

One third of all employees in the ICT services sector work in companies that make use of an application service provider (ASP). This number is not only higher than on average over all sectors (13%), it is also surprisingly high considering the often-stated failure of the ASP concept. In the large company segment the share is even at 38%. This high number can partly be explained by ICT services firms being familiar with the concept of outsourcing in general and with applications service providing in particular. Secondly, in many large companies internal IT departments provide application services to other departments within the company that could be defined as ASP.

Table 2-8: Employees' remote access to the company's computer system

	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
Remote access	39.9	78.7	59.9	77.4	85.1
Planning to enable remote access	12.0	7.2	9.0	5.1	6.9
Wireless access	7.6	31.0	17.6	33.1	35.2
Note: employment-weighted, i.e. figures should be read as "% of employees working in enterprises where…". Computation base: enterprises using computers. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

Remote access to the company's computer systems enables workers more flexible working schemes such as teleworking and can significantly improve work efficiencies of employees working from remote locations such as travelling managers, sales force, technical support staff etc. In ICT services working from home at unusual working times (e.g. in software programming) and working from remote locations (e.g. consultants at the client's site) are very common. Accordingly, 79% of the employees in the ICT services sector work in enterprises that offer their staff remote access compared to only 40% on average. An additional 7% of the ICT services' companies plan to enable remote access within the next year. Furthermore, almost one third of all employees work in companies that offer wireless access solutions. However, this number is strongly influenced by the large company segment, where twice as many companies offer wireless access as in the small enterprise segment. Nevertheless, the gap between large and small companies is significantly smaller than on average over all sectors, where 20% of the large and only 5% of the small companies offer wireless access.

Table 2-9: Internet connection modus

Internet connection	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
Analogue modem	19.0	9.4	14.1	8.0	8.0
ISDN	39.0	23.1	31.4	19.6	20.8
DSL	25.0	24.6	42.1	27.5	18.4
Other fixed	26.9	60.2	17.9	56.5	74.9
Other connection	2.9	4.5	1.1	7.2	5.3
Note: employment-weighted, i.e. figures should be read as "% of employees working in enterprises with…". Computation base: enterprises with Internet access. Multiple answers possible. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

Table 2-10: Internet connection speed

Connection speed	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
< 2 Mbit/s	61.7	36.7	63.1	35.6	27.9
2-10 Mbit/s	17.1	33.3	21.2	52.1	35.3
>10 Mbit/s	7.3	21.9	8.9	7.1	28.0
Note: employment weighted, i.e. figures should be read as "% of employees working in enter-prises with…". Computation base: enterprises with Internet access. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

Companies in the ICT services sector need very powerful Internet connections for conducting business. As a result, 85% of the employees in the sector work in companies with broadband Internet connections such as DSL or other fixed lines (see table 2-9). At 32% the share of employees working in companies with narrowband internet connections, i.e. analogue modems or ISDN is clearly below the average (58%). In accordance with these results, more than half of the employees in the sector

work in companies with a bandwidth of 2 Mb per second or more available, compared to only 24% on average (see table 2-10).

Even small ICT services firms predominantly use broadband connections to access the Internet. Two thirds of them use DSL or other fixed lines while only one third of the small companies in other sectors do. Still, the use of DSL and other fixed connections that are commonly used to connect several employees within a (large) company to the Internet are more frequently used in large enterprises. In accordance with the Internet connection mode, large companies also have more bandwidth available (see table 2-10). Generally, the larger the company the higher the probability that a powerful Internet connection is available. The highest share of companies with broadband Internet connection can be observed in Germany and Finland, while narrowband connections are most prevalent in the UK and France.

Figure 2-6: Narrowband (analogue + ISDN) and broadband (DSL + other fixed) internet connections across countries (in % of enterprises with Internet access)
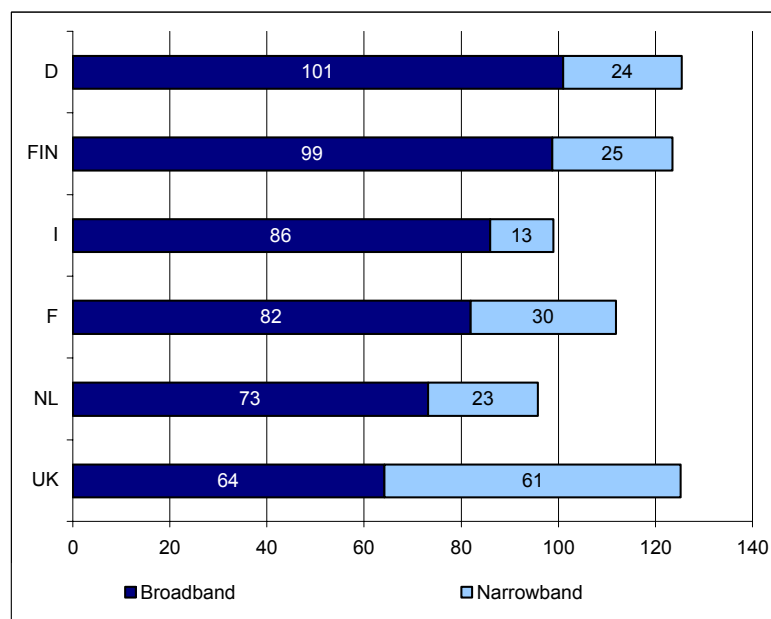
Source: e-Business W@tch (2002)

2.2.2   IT skills

The efficient use of IT is one of the core competencies of ICT services firms and rapid technological changes require considerable efforts in education in the sector. One would therefore expect a strong support of IT skills development in ICT services firms. Indeed, 97% of the employees in the sector work in companies that offer support of IT and networking skills development, which is above the average of 83%.

83% of the employees work in companies where IT training is offered in-house and 72% work in companies that offer IT training by third parties. This kind of formal IT training is, however, offered more often in large companies than in SMEs. In the latter, the usage of working time for learning activities is the most important form of support.

SMEs regard on the job-learning and self-learning activities as more important than formal training schemes. At 20% only half as many small than large ICT services firms rate formal IT training as very important. Nevertheless, overall formal IT training is considered more important in the ICT services sector than on average.

Almost 60% of the employees in the Dutch ICT services sector work in companies that rate formal training schemes as very important, while the same is true for only around one quarter in France and the UK.

Table 2-11: IT skills development

Form of support	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
Any support of IT and networking skills development	83.1	97.0	88.9	94.4	100.0
In-house computer / IT training	52.4	82.6	57.1	65.4	93.0
Computer / IT training by third parties	58.0	71.8	52.9	64.4	78.9
Usage of working time for learning activities	66.4	85.7	82.6	88.2	86.4
Note: employment-weighted, i.e. figures should be read as "% of employees working in enterprises with…". Computation base: all enterprises (excl. NA/DK). Regional coverage: EU-4					

Source: e-Business W@tch (2002)

Table 2-12: Importance of IT training schemes

| Training scheme rated as very important	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
On the-job-learning	58.9	63.2	73.5	73.7	58.7
Formal training	25.4	34.2	20.5	32.0	39.0
Self-learning	37.5	48.8	52.0	40.2	48.6
Note: employment-weighted, i.e. figures should be read as "% of employees working in enterprises with…". Computation base: enterprises using computers (excl. NA/DK). Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

Figure 2-7: Importance of formal training schemes
(enterprises representing ...% of employees)
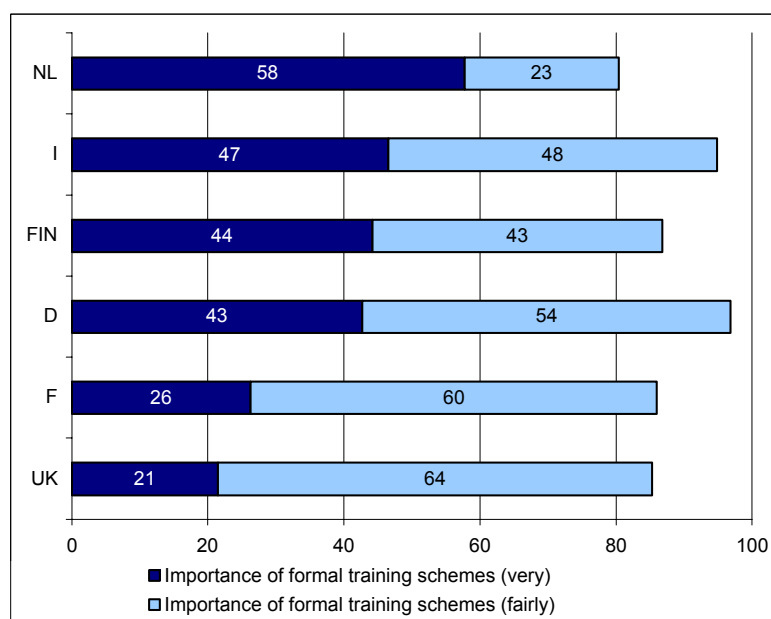
Source: e-Business W@tch (2002)

The level of IT skills and support can also be measured by the number of employees that are mainly occupied with the implementation and maintenance of information technology and networks. Naturally this number is much higher in the ICT services sector than in other sectors. Not only does a higher share of all employees work with computers in this sector, which on average requires a larger IT department, but a functioning IT infrastructure forms the basis of the business in the ICT services sector. Table 2-13 shows that on average a workforce of 117 per thousand employees work in the IT department of ICT services firms, compared to only 69 per thousand on average over all sectors.

The comparison across size classes in Table 2-13 shows that large companies need significantly less IT specialists per thousand employees than small ones. This is firstly due to the strong economies of scale occurring in IT departments. Secondly, it reflects the size class distribution in the ICT services sector: Computer services companies, which have a higher weight in the small company segment, obviously need more IT support and maintenance personnel than telecommunication services companies, which are mainly included in the large company segment.

Table 2-13: Availability of IT specialists

	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
Size of IT department per thousand employees	68.8	116.6	302.5	151.5	48.2
Companies having recruited or tried to recruit staff with special IT skills	29.3	64.8	42.5	78.8	70.7
Companies with great difficulties in recruiting IT specialists	14.4	16.3	29.0	14.7	14.0
Companies with some difficulties in recruiting IT specialists	34.3	38.8	23.1	29.8	43.1
Note: employment-weighted, i.e. figures should be read as "% of employees working in enterprises where…". Computation base: all enterprises. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

Almost two thirds of the employees in the sector work in companies that have recruited or tried to recruit staff with special IT skills during the last 12 months, which naturally is a higher share than on average (29%). Medium sized companies were particularly active recruiters of specialists e.g. for the IT department or for e-business implementation (see table 2-13).

However, ICT services firms have more difficulties in recruiting IT specialists than on average. This is probably due to the higher number of IT specialists needed and to the more specific skill requirements in the sector. Table 2-13 indicates that small companies seem to have more severe problems in attracting IT specialists than large ones. Large companies report some problems as well but obviously can solve these problems more easily. They typically have more resources (time, money and dedicated human resource managers) available for recruiting staff.

The greatest difficulties in recruiting IT specialists are reported by German and Italian ICT services companies (see figure 2-8). In France and the UK, by contrast, only a small fraction of enterprises reports great difficulties in recruiting IT specialists.

Figure 2-8: Difficulties in recruiting IT specialists across countries (enterprises representing …% of employees)
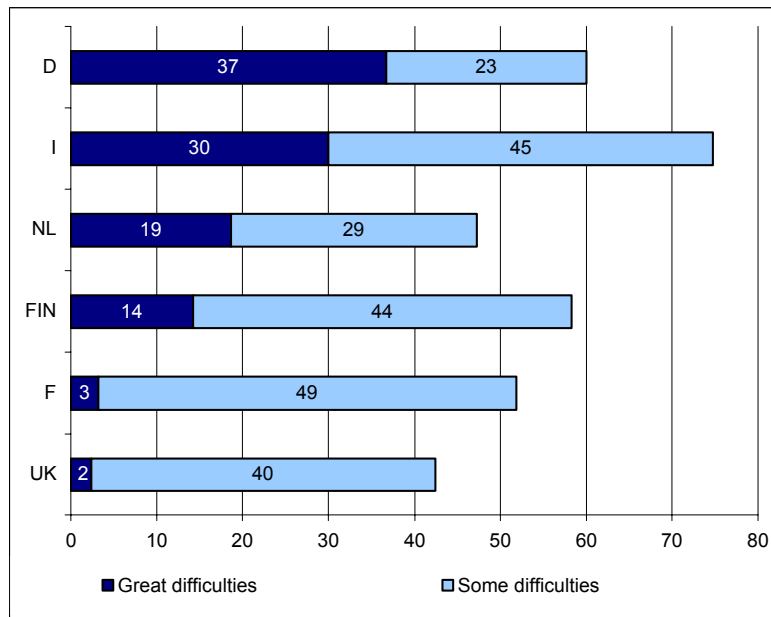
Source: e-Business W@tch (2002)

2.3   Usage and Impact

2.3.1   Internal Processes

While e-business is often related to the exchange of information or goods and services with external business partners, the use of e-business solutions and ICT can, first of all, significantly enhance the efficiencies of internal processes within an enterprise. As has been stated above, one should observe a more frequent use of e-business technologies in ICT services firms than in companies from other sectors, since they are familiar with concepts and technologies, and since they are competent in realising e-business projects

Table 2-14: Usage of online technologies for internal processes

Usage of online technologies to…	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
Share documents / perform collaborative work	28.0	60.1	59.9	73.9	76.7
Automate travel reimbursement of employees	3.9	12.3	12.0	32.6	36.6
Track working hours and production time	9.7	21.8	21.5	40.7	54.2
Support the human resources management	8.4	16.2	15.8	42.6	53.3
For e-learning	12.3	30.2	30.2	30.4	44.0
Posting job vacancies on Internet board	11.6	24.5	24.1	53.5	64.9
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises with…". Computation base: enterprises with Internet access. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

The results in table 2-14 support this hypothesis. The usage of online technologies for several internal business processes is at least two times higher in the ICT services sector than in other sectors. Online technologies are most frequently used to share documents and/or perform collaborative work.

The second most frequently used online technology in ICT services are e-learning tools. 44% of the large and 30% of SME's in the ICT services sector use e-learning tools. Overall, the number is more than twice as high as in other sectors, which can be explained by ICT services firms being faced with the challenge to constantly keep their employees up-to-date with quickly changing technologies and technical innovations. Online e-learning tools can significantly help to support this process.

Online technologies that support human resources management, such as the tracking of working hours or automated travel reimbursements, can particularly improve efficiencies in those parts of the ICT services sector that work project based, e.g. in project teams at different or remote locations. Obviously, in enterprises that employ a large staff, the use of such technologies is more frequent than in smaller enterprises (see table 2-14).

The gap between large and small companies is particularly wide in the use of Internet boards for posting job vacancies: Almost two thirds of the large enterprises but less than one quarter of the small ones post vacancies on Internet boards. This gap is surprising, considering the problems of small companies e.g. in attracting IT specialists (compare table 2-13 above) and the specific advantages of Internet job boards for small companies: while small enterprises can usually not afford large job advertisements and do not have the brand name to attract a high potential staff, the Internet offers them the possibility to address a large number of potential applicants at low cost.

Table 2-15: Current and planned usage of specific IT solutions

| IT system solution	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
CRM					
- current	6.6	22.3	22.1	39.9	52.7
- planned	2.2	5.5	5.5	10.0	5.9
Knowledge management					
- current	5.2	17.5	17.3	28.8	18.9
- planned	2.3	5.4	5.4	5.1	13.9
ERP					
-current	6.6	8.2	7.8	37.3	50.6
- planned	2.5	2.5	2.5	7.3	6.5
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises with…". Computation base: all enterprises. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

Employing e-business tools to improve customer-faced processes is a pressing issue in those areas of the ICT sector that deal with large numbers of customers. In telecommunication services in particular, where - after liberalisation of the market - customers can easily switch their provider when they are not satisfied, companies have a strong incentive to improve customer care and reduce error rates with the help of e-business tools. Overall, customer relationship management (CRM) systems are used by 22% of the enterprises in the ICT services sector, compared to only 7% on average over all sectors. This gap will widen even further if the respondents' plans to implement CRM systems within the next 12 months materialise. CRM systems are most frequently used by large enterprises in the ICT services sector. Obviously, such systems are of much higher value for enterprises with very large numbers of customers, such as telcos. Smaller enterprises, for example IT consulting companies, can easier handle their comparatively few customer relationships manually. Companies from the Netherlands and the UK in particular make extensive use of CRM systems (see table 2-16).

Improving internal coordination as well as the flow and management of knowledge is vital in those sub-sectors of ICT services that produce their services mainly from skilled labour. Knowledge management (KM) systems are used by 17% of the ICT services companies compared to only 5% on average. The highest share of companies using such systems is in the medium sized segment. IT consulting and software programming, for example, are knowledge-based activities where efficient knowledge management is business critical. The efficiency of accessing and sharing knowledge, for example, can be significantly enhanced by the use of suitable IT solutions which are usually installed in the companies' intranets (see for example case study Ericsson Infocom). In the UK and and Finland the highest shares of ICT services firms that use knowledge management systems can be observed.

Knowledge management at Ericsson Infocom Systems

Ericsson's business unit Infocom Systems is based in Sweden and provides communications solutions for public network carriers, enterprises and Internet Service Providers. The protection of new technologies and product features with patents and building up a strong and competitive patent portfolio is seen as an important strategy to secure business opportunities in a competitive market.

At Infocom Systems' Patent Intelligence division a patent analysis tool has been developed that gathers patent information from Ericsson Patent Search and Dialog databases. Dialog is a worldwide provider of online-based information services.

The patent analysis tool is designed to ease administration and analysis of search results, as well as enabling a systematic approach when selecting patents of interest. The system has enabled Infocom Systems to considerably reduce the lead time of identifying relevant patents of interest from large patent portfolios. At the same time it has raised the quality of results.

Source: www.dialog.com

The above average share of companies using ERP systems in the ICT services sector again reflects the sector's familiarity with the efficient usage of IT solutions. The large enterprises in the sector in particular have ERP systems implemented, which help them to support the large number of internal processes. Finnish ICT services firms are the most active users of ERP systems, followed by Italian companies from this sector.

Table -2-16: Usage of specific IT solutions across countries

IT system solution	D	F	FIN	I	NL	UK	EU-6
SCM	3.4	1.8	6.8	0.0	4.5	3.4	2.7
CRM	22.3	18.8	21.5	12.9	29.0	26.9	22.8
Knowledge management	15.6	12.0	20.7	7.1	17.0	23.4	17.5
ERP	12.9	14.2	27.1	17.2	14.1	1.8	8.8
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises with…". Computation base: all enterprises.							

Source: e-Business W@tch (2002)

2.3.2   Processes of the extended enterprise

The main idea behind the concept of an "extended enterprise" is that a company not only consists of its employees – from assembly hall to management board – but also of a network of business partners such as its suppliers and even its customers. Enterprises that want to be successful must not only look at their internal processes but also need to manage this network efficiently and provide all members of the network with exactly the information they need.

Several rather sophisticated e-business solutions and concepts such as supply chain management (SCM), e-collaboration, vendor-managed inventory (VMI), EDI networks and even many electronic marketplaces address these issues of an extended enterprise. While SCM and VMI are mostly concepts with a history in the production of physical goods that have been used to optimize product flows and inventories, EDI networks have also been used for quite a long time in telecommunications. With ELFE there even exists a special EDI subset for electronic telephone billing.

Table 2-17: Use of online technologies for cooperation with external business partners

	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
Online collaboration with business partners for designing products	12.7	31.6	31.4	45.0	50.7
Online collaborating with business partners to fore-cast product demands	10.3	20.7	20.7	26.6	20.8
Online management of capacity / inventory	8.9	8.3	8.1	18.2	32.9
Electronic exchange of documents with suppliers	42.0	59.4	59.5	52.8	60.3
Electronic exchange of documents with customers	39.3	62.7	62.7	63.1	60.5
Online negotiation of contracts	16.0	34.9	35.1	19.9	20.3
Access to an extranet of business partners	17.9	45.5	45.4	49.5	40.3
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises with…". Computation base: enterprises with Internet access. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

As table 2-17 shows, the ICT services sector is very advanced in using online technologies to cooperate with external business partners. Almost all indicators are considerably above average. The advance is strongest for online collaboration in the product design phase, for online negotiation of contracts as well as for having access to an extranet of business partners. Online collaboration for product design in particular is very much favoured by the sort of products and services produced in this sector. Software, due to its digital nature, is ideally suited for a distributed development. Indeed the whole distributed programming model for the development of Open Source software is based on this possibility. The advanced state of online cooperation in the ICT services sector strongly facilitates the division of labour in this sector. The decrease in costs for cooperation allows even very small and specialised companies to work together with others on larger projects.

The use of online technologies for most forms of cooperation is also comparatively widespread among small ICT services firms, whereas in other sectors the large companies show much higher usage rates. In particular the electronic exchange of documents with suppliers or customers is as frequently observed in small as in large enterprises. Nevertheless, it is probably safe to assume that the technologies used to exchange documents differ between the size classes. While unstructured e-mail fits the needs of small companies quite well, large enterprises often need more structured ways of exchanging documents and might use special software to manage it.

Some elements of online cooperation, especially online negotiation of contracts, are significantly even more often used by small (35%) than by large companies (20%). This might first of all reflect different buying behaviours. Negotiating prices for and buying small volumes of inputs can easily be conducted via e-mail, while the negotiation of larger supplier contracts, which is frequent in large enterprises, is still mostly conducted offline. Secondly, it might also reflect different sub-sector compositions in the size classes. As small enterprises are more likely to be computer services enterprises than large companies, it might also reflect different purchasing behaviour between these two groups.

Table 2-18: Current and planned usage of SCM and EDI

	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
SCM					
- current	1.5	2.5	2.5	4.4	11.6
- planned	1.7	5.3	5.3	2.5	2.3
EDI					
- current	9.4	12.2	12.0	27.1	40.1
- planned	2.0	3.9	3.9	3.6	5.7
Standard EDI usage	63.4	63.9	63.6	71.5	84.1
Internet-based EDI usage	40.4	77.3	78.3	48.4	30.9
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises with…". Computation base: all enterprises for lines 1 - 4, enterprises using EDI for lines 5 - 6. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

The suggested difference in the usage of formal cooperation software by small and large companies is supported by the results in table 2-18. The use of supply chain management solutions, for example, is four times as high in large companies as in small ones. Also the use of EDI is more than three times as high in large as in small companies. Taking into account these differences by size class, it is surprising that the overall use of these software solutions is more frequent in the ICT services sector than across industries – despite this sector being dominated by small companies. The gap between the ICT services sector and the cross-industry average in the future will even widen if the companies' stated plans to use SCM and EDI within the next 12 months materialise.

The usage patterns of standard EDI and Internet-based EDI are similar to those in many other sectors. Large enterprises, which typically started to use EDI many years ago, primarily employ traditional EDI, while smaller companies have higher usage rates for Internet-based EDI systems. However, in both size classes standard and Internet-based EDI co-exist to a large extent. As this leads to double-spending on the respective infrastructure (e.g. value added networks) or solutions, the numbers indicate future saving potentials from converging to a single basic technology for EDI systems.

Table 2-19: Current and planned participation in e-marketplaces

	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
Participation in e-marketplaces	5.3	11.9	11.9	14.5	7.8
Planned participation in e-marketplaces	3.4	9.0	9.1	5.0	4.4
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises with…". Computation base: all enterprises. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

The use of online e-marketplaces is above average in the ICT services industry as well. More than twice as many companies as on average use e-marketplaces right now and almost three times as

many than on average plan to do so in the future. Thus, the headstart of ICT services will increase if these plans become reality. Even in those countries where marketplaces are currently not much used – for example in Finland – many companies plan do so in the future, as figure 2-9 shows. If these plans materialise, between 17% and 25% of ICT services companies in most countries will be using e-marketplaces in the near future. An exception is France, where the use of e-business as indicated in the *e-Business W@tch* survey is generally low, which can probably partly be explained by different definitions of e-business and e-marketplaces.

Figure 2-9: Current and planned participation in e-marketplaces across countries
(in % of all enterprises)
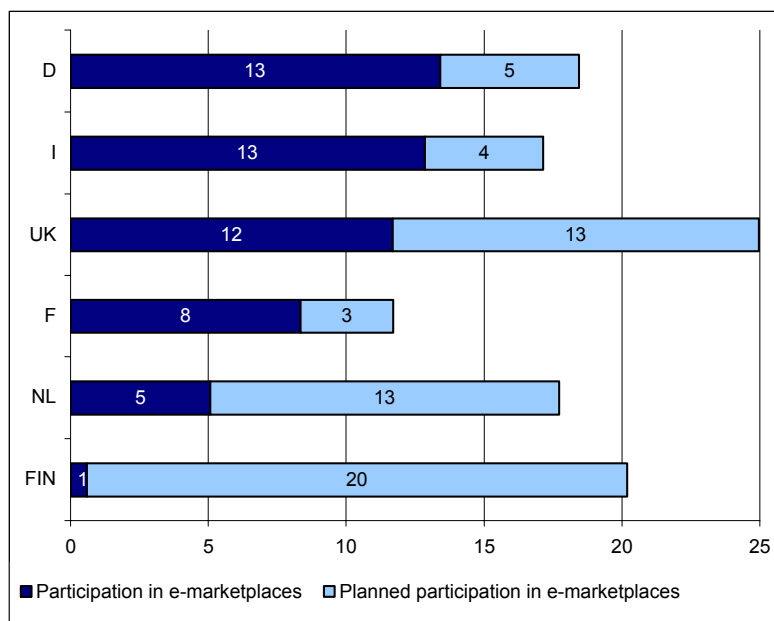
Source: e-Business W@tch (2002)

E-marketplaces in the original sense, i.e., Internet platforms bringing together several buyers and several sellers to conduct online transactions, are used in a variety of different ways in ICT services. There exist, for example, bandwidth marketplaces for telecommunications, software-related marketplaces for expert knowledge as well as for freelance work, and finally intermediaries for software, research, and similar non-physical products.

As the first *e-Business W@tch* report on the ICT services sector has shown, marketplaces for ICT services are still in an initial phase, and their development is currently suffering from the low dynamics of the ICT sector. Many ICT services companies currently have overcapacities, so that there are only few buyers for products and services offered on the marketplaces, leading to low usage rates.

Table 2-20: Operation of e-marketplaces

E-marketplaces operated by…	All sectors	ICT services
a single buyer/seller	35.5	64.5
an industry consortium of buyers/sellers	13.7	5.2
an independent third party	31.1	32.2
Others	16.9	19.6
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises with…". Computation base: enterprises participating in e-marketplaces. Regional coverage: EU-4.		

Source: e-Business W@tch (2002)

In the light of this dismal assessment of e-marketplaces for ICT services, the high usage rates reflected in table 2-19 come as a surprise. However, an explanation is given by the numbers in table 2-20. About two thirds of those ICT services companies using e-marketplaces indicate that they use e-marketplaces operated by a single buyer or seller. This number is almost twice as high as on cross-industry average. Sites operated by single buyers or sellers, however, are not marketplaces in the strict sense of the definition provided above. ICT services companies seem to buy and sell above average using buy-side and sell-side solutions of single companies instead of "real" marketplaces, which makes the survey results compatible with the above assessment on ICT services marketplaces.

The results also make clear that e-marketplaces are only one way of buying and selling on the Internet, of negotiating delivery contracts or of answering calls for tenders. Large companies in particular often list calls-for-tenders on their own websites, which also can be accessed and answered by unknown companies. Thus, e-marketplaces in the strict sense are always in competition to these company sites that offer many of the same advantages. As they also pose many similar problems, it is more useful to analyse different types of platforms offering similar functionality (e.g. auctions, calls for tender) than similar platforms (e.g. marketplaces in the strict sense) offering different functionalities.

Table 2-21: Activities on e-marketplaces

| Activity on e-marketplaces	All sectors	ICT services
Catalogue-based offering	41.1	34.8
Catalogue-based purchasing	35.6	55.2
Selling on auctions	15.8	14.4
Bidding on auctions	17.7	24.0
Launching calls for tender	15.3	12.1
Answering calls for tender	24.3	34.7
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises with…". Computation base: enterprises participating in e-marketplaces. Regional coverage: EU-4.		

Source: e-Business W@tch (2002)

TED – Tenders Electronic Daily

TED is the online version of the supplement S of the Official Journal of the European Communities, which lists tenders by public authorities (e.g., EU institutions, central government, local or regional authorities, bodies governed by public law) from all member states of the European Union. All public tenders exceeding specific contract values must be published throughout the EU, as specified in a number of EU directives. For example, for service contracts this threshold level is at 200,000 Euro, for supplies in the telecommunications sector it is at 600,000 Euro.

Each year, supply and public works contracts worth more than 500 billion Euro are published by public authorities in the EU. Each day, the Supplement to the Official Journal publishes over 650 tenders. This also includes many tenders of interest to the ICT services sector. Apart from supplies to the telecommunication sector these are specifically purchases of hardware and software by public institutions as well as system integration and consulting contracts.

Since 1998, the supplement has no longer been printed but is made available on CD-ROM and on the Internet. The database offers the possibility to search for current as well as past tenders using a large variety of search criteria. All steps beyond finding a call for tender, however, are dealt with outside the scope of this service.

Source: ted.eur-op.eu.int

ICT services companies are stronger passive users of e-marketplaces than active users. While the fraction of companies buying from catalogues, bidding on auctions and answering calls for tenders are above cross-industry average, the share of companies offering products in catalogues, selling on auctions and launching calls-for tender is below average. One reason for this outcome might be that the ICT services sector is dominated by small enterprises, for which such a usage pattern is most sensible. Due to few observations, however, no statistically robust answers can be given to this question.

About one third of ICT services companies that use e-marketplaces indicate that they are answering calls for tender. Such sites offering tender databases are also not necessarily e-marketplaces in the traditional definition but rather information sites, since the final transaction (conclusion of the contract) is conducted outside the scope of the Internet platform. The high fraction of users indicates that such services are nevertheless important for the ICT services sector.

2.3.3   Purchasing

Online purchasing is closely related to the concept of the extended enterprise, as the relationship to suppliers forms one element of the extended enterprise. The survey results in table 2-22 show that not only is the fraction of ICT services companies already purchasing goods or services online extraordinarily high (81%), but two thirds of these companies have already started with online purchases more than two years ago. Furthermore, there is no difference between the share of large and small companies that purchase online, whereas in other sectors large companies are usually more active in online purchasing.

Table 2-22: Current and planned online purchases

	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
Currently purchasing online	36.0	81.0	81.1	74.1	80.0
Plan to purchase online	6.7	3.8	3.8	1.6	2.3
Purchasing online for					
… > 2 years	42.3	67.4	67.5	65.0	49.4
… 1-2 years	40.1	24.3	24.2	28.5	37.2
… < 1 year	15.4	6.2	6.2	2.5	8.1
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises …". Computation base: all enterprises for lines 1-2, enterprises purchasing online (incl. NA/DK) for lines 3-5. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

The significant importance of online purchasing in this sector, however, cannot necessarily be interpreted as the existence of large, sophisticated procurement systems. Since companies have been asked whether they are purchasing goods and services online, the answers comprise all sorts of online buying.

And the preconditions for buying online are good in the ICT services sector. Firstly, many inputs necessary for the provision of ICT services can be easily bought on the Internet. This applies to software, hosting services, Internet and telecommunication services, office supplies, books, database content, research, etc. As many companies in this sector are small, buying manually via websites is often more appropriate than implementing large and complicated e-procurement solutions. And secondly, the familiarity of ICT service companies with the possibilities of the Internet as well as the suitability of many intangible inputs for electronic delivery make online ordering a logical thing to do.

Table 2-23: Share of online purchases in total purchases

Share in total purchases	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
> 50%	9.4	20.0	20.0	21.2	0.0
26 to 50%	9.9	21.5	21.6	15.2	3.3
11 to 25%	19.3	23.2	23.2	28.1	22.1
5 to 10%	24.8	19.2	19.2	18.4	14.8
< 5%	36.5	16.1	16.0	17.0	59.8
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises with…". Computation base: enterprises purchasing online. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

Purchasing online is of special importance for small companies in the ICT services sector. For 42% of the small companies that buy online, these online purchases constitute more than a quarter of their total purchases. The same value for large companies is only at 3%. This outcome points at substantial differences between online buying of small and large companies. While small companies mostly buy manually using the Web, larger companies tend to use more sophisticated procurement solutions to order within pre-established contracts. Thus, online purchasing of small and large companies is fundamentally different.

Table 2-24: Type of goods purchased online

Type of goods purchased online	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
MRO goods	64.4	72.4	72.4	80.8	72.6
Direct production goods	49.4	67.4	67.7	49.7	52.6
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises …". Computation base: enterprises purchasing online. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

In ICT services, both sorts of inputs, direct as well as indirect MRO goods, are purchased online to a larger extent than on average over all sectors. The difference for direct production goods is especially large (see table 2-24).

Figure 2-10: Current and planned online purchases across countries (in % of all enterprises)
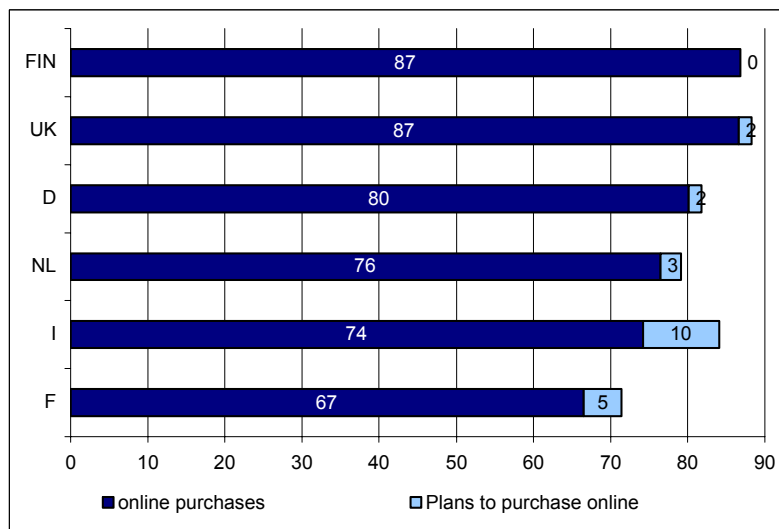
Source: e-Business W@tch (2002)

Online purchases are important in the ICT sector of all countries that have been surveyed. Even in France, which again shows the lowest value for this activity, around two thirds of the enterprises are currently purchasing goods or services online. Figure 2-10 also shows that online purchasing is coming to a point of saturation in the ICT services sector. Only in Italy and to some extent in France a significant percentage of enterprises are planning to purchase online.

Figure 2-11: Online share of total purchases >10% across countries
(In % of enterprises purchasing online)
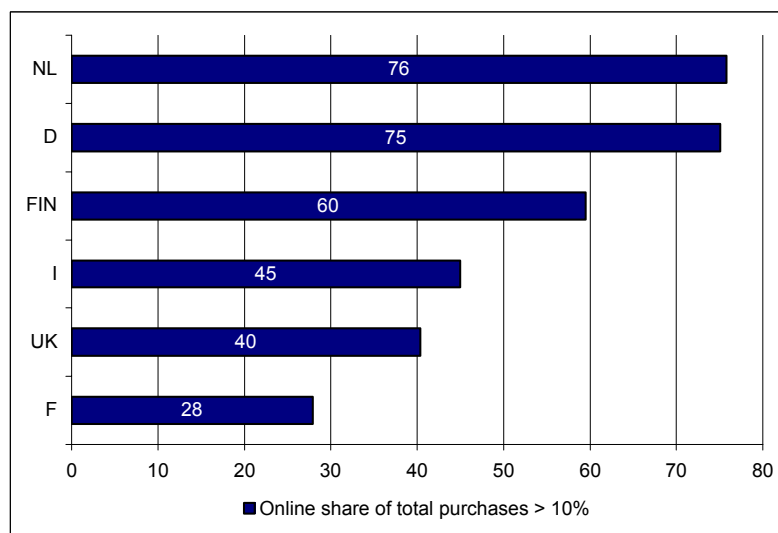
Source: e-Business W@tch (2002)

While the usage of online purchasing is rather similar across countries, there are strong differences in its importance. In the Netherlands, as well as in Germany, online purchasing already makes up for more than 10% of total purchases in three quarters of the companies that purchase online. In France this value is only at 28%. Thus, not only has France the lowest share of companies purchasing online, but those that purchase online also do so to a lesser extent than in other countries. However, it should be kept in mind that different definitions of online purchasing across countries might influence these outcomes.

Table 2-25: Barriers to online purchasing

Completely agreeing to statement	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
Requires face-to-face interaction	37.7	20.9	20.9	25.2	29.5
Suppliers do not sell online	31.6	14.8	14.8	12.5	18.0
Concerns about data protection and security issues	30.7	25.0	25.0	27.7	24.2
Technology is expensive	23.6	12.7	12.7	12.0	24.6
Suppliers' technical systems are not compatible	12.7	9.7	9.7	10.2	16.0
Cost advantage is insignificant	21.9	17.4	17.4	14.8	11.6
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises …". Computation base: all enterprises. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

Potential barriers to online purchasing are generally less important in the ICT services sector than across all industries. All potential barriers listed in table 2-25 are considered important by a lower share of ICT services firms than on average.

The gap between ICT services and the average is largest for the barrier that "suppliers do not sell online" and that "online purchasing requires face-to-face interaction". Obviously the chicken-egg problem of who has to start with online purchasing has already been solved in the ICT services industry. It might also have been favourable that setting up web-based sell-side solutions is easier for suppliers than setting up complex e-procurement solutions.

The low importance of face-to-face interaction for purchasing might be explained, firstly, by the fact that software and similar products can be downloaded. Thus, testing these products and making a purchasing decision can be done without any sales assistance. And secondly, it can also be explained by the familiarity of ICT service companies with using asynchronous communication like e-mail and web forms. In other sectors communication is much more strongly dominated by traditional ways.

The importance of the barriers to purchasing online, however, differ significantly across countries. For example, 46% of the ICT services companies in Italy but only by 5% of those in the Netherlands see the requirement of face-to-face interaction as a major barrier to purchasing online. In the same way, insufficient preparation of suppliers for selling online is seen as a barrier by 30% of ICT services enterprise in Italy and the UK but only by 7% in Finland and Germany.

Figure 2-12: Major barriers to online purchasing across countries
(in % of enterprises purchasing online)
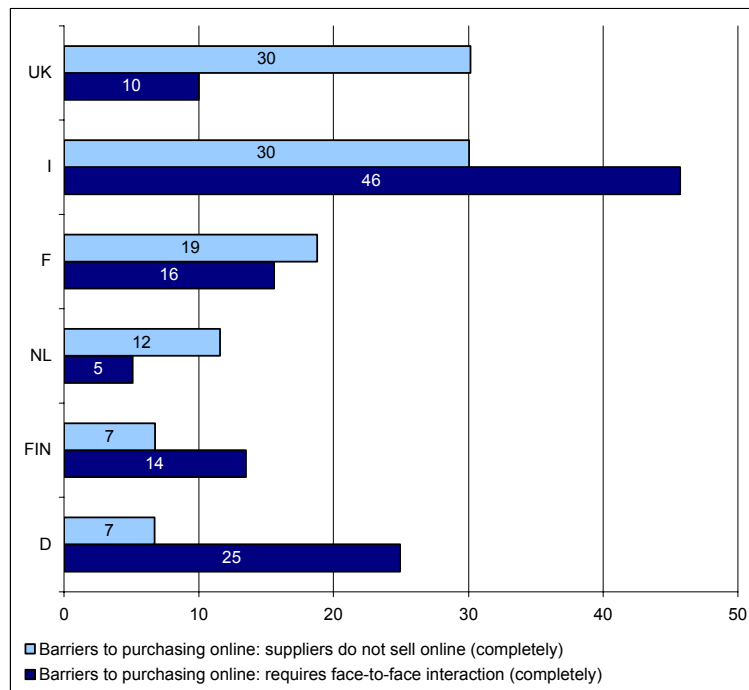
Source: e-Business W@tch (2002)

Table 2-26: Impact of purchasing online

Impact on…	Very positive	Fairly positive	Neither positive nor negative	Fairly negative	Very negative
Procurement costs					
ICT services	17.2	44.9	34.1	2.7	1.1
all sectors	12.5	45.7	39.2	2.1	0.5
Relations to suppliers					
ICT services	15.5	38.9	36.1	9.0	0.6
all sectors	11.4	33.8	44.5	8.4	1.9
Internal business processes					
ICT services	18.1	53.3	25.3	3.2	0.2
all sectors	16.6	41.8	38.6	1.9	1.0
Costs of logistics and inventory					
ICT services	15.7	31.5	48.5	4.3	0.0
all sectors	12.2	35.0	47.9	2.4	2.5
Number of suppliers					
	Increased	**Constant**	**Decreased**		
ICT services	33.4	55.4	11.1		
all sectors	24.4	70.2	5.4		
Note: enterprise- weighted, i.e. figures should be read as "% of enterprises reporting…". Computation base: enterprises purchasing online (excl. DK/NA). Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

Despite the high share of companies purchasing online, the overall assessment of its impacts is more or less in line with the assessment of other sectors. Only in two areas do ICT services firms consider the impacts of purchasing online significantly more positive than on average. The relationship to suppliers has improved in 54% of ICT services companies but only in 45% across all sectors, and the internal business processes have been affected positively in 71% of ICT services companies, but only in 58% across all sectors.

The positive impact on internal business processes is also by far the most important. This shows again that an especially beneficial impact of e-business is the streamlining of processes and the cost savings associated with this. In comparison, savings from finding cheaper suppliers and thereby decreasing procurement costs – which are a major focus of the public debate about e-business – are of lesser importance.

The number of suppliers has also been affected by online purchasing in the ICT services sector. Larger shares than on average report a decrease as well as an increase in the number of suppliers. Both might be considered positive, depending on the actual circumstances. While a low number of suppliers decreases processing and settlement costs and enables the buyer to negotiate larger rebates due to higher buying volumes, a higher number of suppliers might be beneficial in markets where low competition keeps prices high. Purchasing online allows companies to circumvent these suppliers and search for new ones with more favourable conditions.

Distinguishing the assessments of the impact of purchasing online by size class classes provides a rather differentiated picture. Neither small nor large companies unanimously consider all impacts from online purchasing as more or less positive. On one hand, relations to suppliers as well as the costs of logistics and inventory are considered by more small companies to have been positively influenced than by large companies. On the other hand, a larger fraction of large companies consider the impact of purchasing online on internal business processes as positive. Comparing the impacts of online purchasing across countries supports the conclusions drawn so far. In almost all countries do ICT services firms consider the impact on the efficiency of internal business process the most positive one. Between 64% (Germany) and 83% (Netherlands) indicate a positive impact.

Table 2-27: Impact of purchasing online across size classes

Impact on…	Very positive	Fairly positive	Neither positive nor negative	Fairly negative	Very negative
Procurement costs					
0-49 empl.	17.1	45.8	33.4	2.7	1.0
50-249 empl.	9.6	47.9	41.1	1.5	0.0
250+ empl.	14.3	44.6	41.1	0.0	0.0
Relations to suppliers					
0-49 empl.	15.0	38.9	36.3	9.3	0.5
50-249 empl.	4.6	36.0	46.3	12.5	0.7
250+ empl.	12.7	28.5	49.8	9.0	0.0
Internal business processes					
0-49 empl.	18.8	53.5	24.6	2.9	0.2
50-249 empl.	15.4	52.4	30.2	2.0	0.0
250+ empl.	21.9	56.8	21.3	0.0	0.0
Costs of logistics and inventory					
0-49 empl.	15.4	31.6	48.5	4.6	0.0
50-249 empl.	13.0	25.4	55.2	6.4	0.0
250+ empl.	9.3	30.5	49.9	10.3	0.0
Number of suppliers					
	increased	Constant	Decreased		
0-49 empl.	33.7	54.7	11.6		
50-249 empl.	24.3	60.1	15.6		
250+ empl.	28.1	49.9	22.1		
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises reporting…". Computation base: enterprises purchasing online (excl. DK/NA). Regional coverage: EU-6.					

Source: e-Business W@tch (2002)

Table 2-28: Impact of purchasing online across countries

Very or fairly positive impact on…	D	F	FIN	I	NL	UK	EU-6
Procurement costs	54.6	42.2	61.5	61.2	73.7	67.3	62.8
Supplier relationship	21.7	51.8	53.7	69.9	44.9	59.1	53.7
Efficiency of internal business process	63.5	67.0	77.0	69.4	83.2	75.0	72.3
Logistics and inventory costs	37.6	38.0	17.6	62.4	47.5	46.1	46.8
Number of suppliers	37.1	34.7	65.4	55.9	50.1	43.1	45.2
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises reporting…". Computation base: enterprises procuring online (excl. DK/NA).							

Source: e-Business W@tch (2002)

2.3.4 Marketing and Sales

ICTs and the Internet can be used in various ways to support marketing and sales activities of ICT service companies. A simple but very effective way for companies to address current and potential clients is to provide information on products and services on their website. 84% of all companies in the ICT services sector have their own website compared to only 54% on average over all sectors. While there is still a certain gap between large and small companies, this gap will close over the next 12 months if the small companies' plans to implement their own website will materialise.

Table 2-29: Website

	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
Having a website	53,6	83,9	83,7	96,9	95,6
Plans to have a website	16,2	8,2	8,3	1,1	0,0
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises with…". Computation base: all enterprises. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

The first *e-Business W@tch* report on the ICT services sector indicated that companies in this sector make sophisticated use of their website for new ways of marketing. Consulting firms in particular go beyond the pure listing of activities and service offers on their websites. They often make considerable amounts of research available on their sites in the form of reports, extensive studies, white papers or newsletters. In this way they transform their websites into knowledge portals for their areas of specialisation and at the same time present themselves as having major competencies in these areas. For software manufacturers, the possibility of creating different versions of the same software without high costs makes it feasible to use the websites for marketing purposes. This can, for example, be done by offering trial versions of software with only limited functionality. As with consulting companies, providing work samples helps overcome typical trust problems with goods purchased in this way.

Around 90% of all companies in the countries surveyed will have a website one year from now. No major differences can be observed between the countries with the exception of Italy. In Italy, currently only 70% of the ICT services companies have a website and an additional 11% plan to have one within the next 12 months.

While more than half of all companies in the EU-4 have their website designed and/or maintained by external service providers, the largest share of ICT service companies naturally takes care of these tasks in-house. This strategy, however, requires particularly small companies to employ a significant number of employees in a dedicated web department. On average, 151 web employees per thousand employees are needed to maintain the website in a small company, compared to only 4 employees per thousand in large companies. These numbers make it questionable if the in-house strategy of small companies is indeed economical. On the other hand, the smaller and medium-sized companies in particular often have their websites hosted by external service providers rather than in-house.

Figure 2-13: Current and planned website across countries (in % of all enterprises)

Source: e-Business W@tch (2002)

Table 2-30: Website maintenance

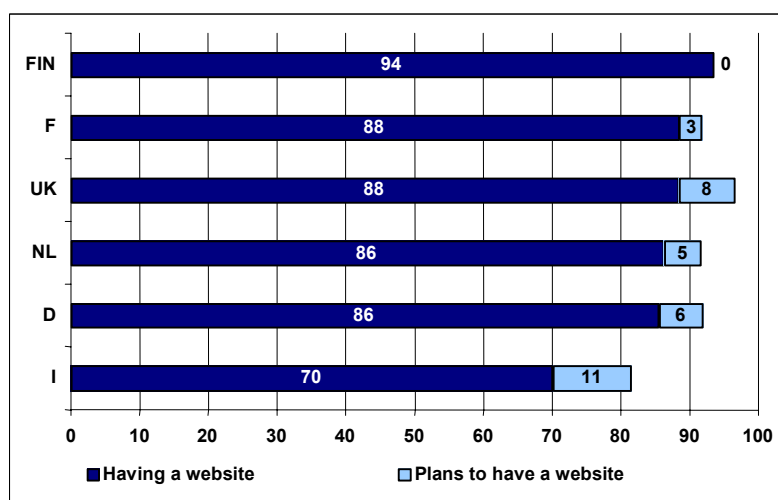|	All sectors	ICT services			
		All enterpr.	**0-49 empl.**	**50-249 empl.**	**250+ empl.**
Web hosting by external service providers	60.0	59.1	59.3	50.6	32.7
Web design by external service providers	56.5	30.6	30.6	32.8	43.5
Website maintenance by external service providers	52.5	28.6	28.7	20.6	20.1
Size of web department per 1000 employees	68.2	148.8	150.8	22.0	3.8
Usage of content management systems	14.9	25.7	25.5	35.3	40.6
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises …". Computation base: Enterprises having a website. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

22% of all companies in the ICT services sector already sell products and/or services online and an additional 18% plan to do so over the next 12 months. If these plans materialise, twice as many companies in the ICT services sector will sell online one year from now than on average over all sectors. Due to its digital nature, standard software is a product offered by the ICT services sector which is particularly suitable for online selling. Software can be ordered online and delivered in physical form (e.g. on CD ROM) or directly downloaded from the seller's website. Indeed most of the larger consumer-oriented software companies now have web shops where the software can be bought for postal delivery as well as for download. But many small software companies also offer online sales possibilities to their customers and constantly improve their online sales services (see case studies below).

Table 2-31: Current and planned selling online

	All sectors	ICT services			
		All enterpr.	**0-49 empl.**	**50-249 empl.**	**250+ empl.**
Currently sell online	12.3	22.2	22.1	22.9	36.2
Plan to sell online	8.9	18.2	18.3	6.9	5.7
Selling online for					
… > 2 years	41.6	52.5	52.5	46.9	60.0[1]
… 1-2 years	35.9	20.0	19.9	33.7	27.9[1]
… < 1 year	20.1	27.4	27.7	17.5	0.0[1]
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises …". Computation base: all enterprises for lines 1-2, enterprises selling online (incl. NA/DK) for lines 3-5. [1] number of obs < 10 interpret with care. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

> ### *Online sales activities of small software companies: e-vendo and Astarte*
>
> The small German software company e-vendo AG (24 employees) offers standard-systems for integrated e-commerce solutions. E-vendo offers an online shop, where all its software products can be bought online or rented online within the ASP model.
>
> Before ordering, interested customers can test the web-enabled software online without downloading. Customers can also download handbooks and white papers.
>
> Once the customer has registered, the login-name and password can always be used for further ordering activities at the e-vendo online shop.
>
> Website: www.e-vendo.de
>
> ASTARTE NEW MEDIA AG, a small German software solutions company (35 employees) offers web-based content management software.
>
> ASTARTE offers a product catalogue online and the software can be bought at an online shop including programmes, single modules and bundles. While some products are only available via download others can be purchased both as an Internet download and as a software package with a printed user manual. The software is easy to download from the Internet, and its installation and use are entirely Internet-based.
>
> Customers unsure about which configuration best fits their needs can use the interactive "Product Configurator" which, after posing a few questions, suggests a specific solution.
>
> Before buying, customers are able to download a demo version, a fully functional version including an installer and a manual. A complete demo-website is available so potential customers can get acquainted with the functions of the software. With the demo version templates can be modified and the result of the modifications can be seen in the preview. The demo version can be updated to a fully functional version at anytime.
>
> In addition, the website contains an Internet forum in which customers and developers exchange ideas and suggestions for possible improvements. In "Version History" an overview of changes and bugfixes in earlier versions of the software can be obtained.
>
> Source: www.webedition.de

Currently, a gap in online sales activities of large and small ICT services companies can be observed: only 22% of the small but 36% of the large companies in the sector sell online. This gap will close, though, since 18% of the small but only 6% of the large companies plan to implement online sales systems within the next 12 months. If these plans materialise, the medium sized companies will fall back behind their smaller and larger competitors.

Table 2-32: Share of online sales in total sales

| Share of total sales	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
> 50%	8.7	20.5	20.7	3.5	0.0
26 to 50%	9.6	10.7	10.8	0.0	19.0
11 to 25%	10.5	16.0	16.0	16.2	9.5
5 to 10%	25.6	19.4	19.4	24.3	9.5
< 5%	45.6	33.4	33.1	56.0	62.1
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises with…". Computation base: enterprises selling online. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

As table 2-32 shows, the importance of online sales for those companies that actually sell online is also notably higher in the ICT services sector than on average. The percentage of companies for which the share of online sales in total sales is above 10% is at 47% in the ICT services sector and only at 29% on average over all sectors.

But significant differences in the various company size classes can be observed. In the small company segment there seems to be a number of "online specialists" that sell more than 50% of their total sales online, but none of the large enterprises is selling online to this extent.

Figure 2-14: Currently and planned selling online across countries (in % of all enterprises)
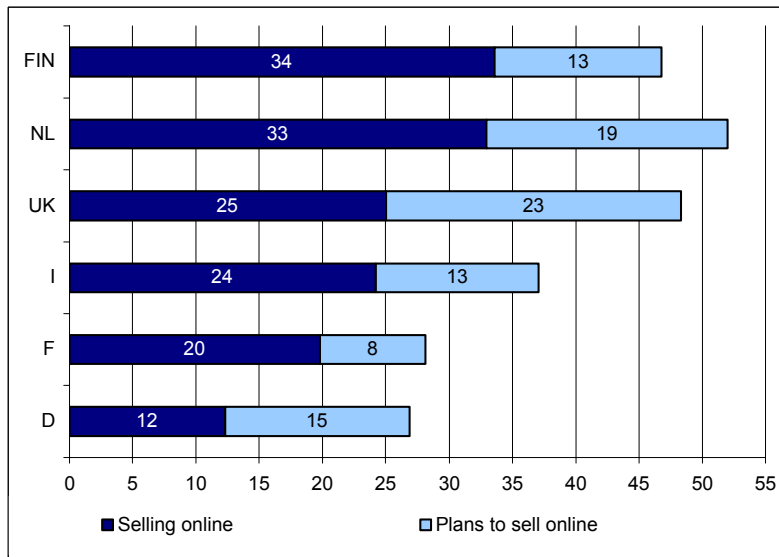
Source: e-Business W@tch (2002)

The countries most active in selling online in this sector are Finland, the Netherlands and the UK. In Germany, where ICT services companies are very active in online activities on the buy-side (compare section 2.3.3), sell-side activities are least developed of all countries surveyed.

Table 2-33: Online sales to consumers, businesses, and the public sector

Online sales to	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
Consumers	68.7	57.7	57.9	55.2	33.8
Businesses	60.9	94.1	94.3	83.4	66.2
Public Sector	50.3	71.1	71.2	66.4	49.6
Note: enterprise weighted, i.e. figures should be read as "% of enterprises selling online…". Computation base: enterprises selling online. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

While on average over all sectors, consumers are the major online customers, ICT services firms mostly sell online to other businesses, which are also the primary customers of this sector (see table 2-33 and figure 2-15). Online selling to the public sector is very common in ICT services, too. More than 70% of all enterprises sell online to public entities, compared to only 50% on average. Small companies in particular are active in selling online to the public sector, which again underlines the importance of online tenders of public institutions (compare section 2.3.2). Even though only 13% of the surveyed enterprises see consumers as their primary customers, 58% sell online to this customer group.

Figure 2-15: Primary customers (in % of all enterprises)
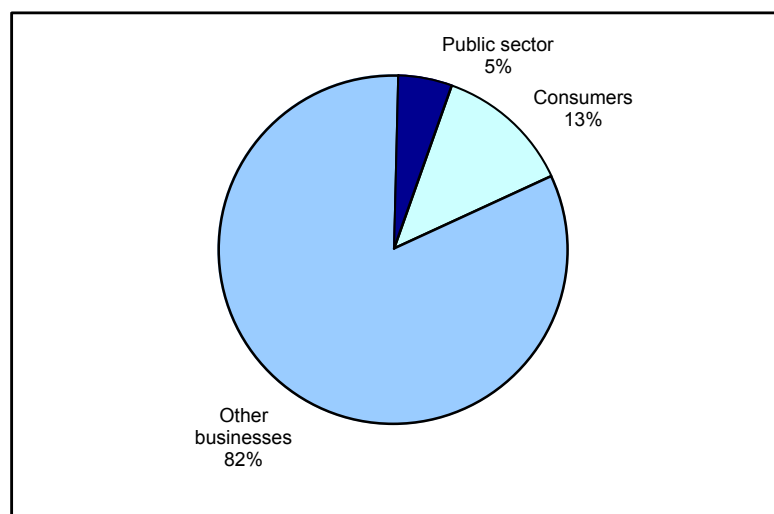
Source: e-Business W@tch (2002)

Table 2-34: Regional online sales

Online sales mainly to …	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
a local market	23.4	16.7	16.7	23.0	16.2
a national market	42.3	48.8	48.9	35.6	55.8
a global market	33.1	30.6	30.5	39.6	21.7
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises …". Computation base: enterprises selling online. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

Online sales in the ICT services sector are predominantly directed to national markets. Only 17% of the ICT services companies serve local customers online, while almost half of them mainly sells online to national customers and less than a third to global customers.

Some differences can, however, be observed between the company size classes. Large companies are least active in selling online to international customers. This result might be explained by the fact that large companies often have national branch offices which each sell to their respective national market. Most active in selling online to a global market are medium sized companies, which obviously make active use of the Internet to reach an international customer base.

Table 2-35: Online sales channels

Selling online…	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
through company website	86.2	92.0	91.9	98.1	83.8
through e-marketplaces	36.4	35.4	35.3	38.6	40.4
via extranet	4.7	4.8	4.5	26.0	34.2
via EDI	5.9	4.8	4.6	18.6	21.7
via mobile channels	7.1	10.6	10.6	11.8	5.8
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises …". Computation base: enterprises selling online. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

The most important online sales channel in the ICT services sector is – as in other sectors – the company website (see table 2-35). Particularly for smaller enterprises this is the major online sales channel, while 40% of the large companies also use e-marketplaces, 34% sell online via their extranets and 22% via EDI. Small companies, on the other hand, are more active in discovering new mobile sales channels, 11% of the SMEs currently use this medium while only 6% of the large companies do.

Table 2-36: Processing of online orders

Online orders…	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
are fully integrated with backend systems	9.0	23.5	23.4	14.8	76.2
generate an automatic e-mail	72.8	68.9	69.1	65.4	0.0
generate a fax informing about order	8.7	3.5	3.5	1.9	0.0
trigger other forms of information	6.4	0.2	0.0	16.1	11.7
trigger business processes	28.8	43.8	43.8	41.6	54.5
Online sales system with SSL is offered	45.9	52.3	52.3	49.1	66.2
Online payment system offered	31.1	42.7	43.0	11.8	46.3
Online after-sales-service is offered	48.8	64.5	64.7	46.8	56.3
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises …". Computation base: enterprises selling online. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

As one would expect, ICT service companies that sell online have more sophisticated online order processing systems in place than companies from other sectors. For example, in 24% of the ICT services firms online orders are fully integrated with the backend systems (all sectors: 9%), 43% have online payment systems implemented (all sectors: 31%), and 65% offer online after-sales-services (all sectors: 49%).

Again, some significant differences between large and small companies can be observed. In more than three quarters of the large companies that sell online, online orders are fully integrated with backend systems. The same is true for only 23% of the small and 15% of the medium sized ICT service firms. In SMEs, incoming online orders often simply generate an automatic e-mail informing about the order.

The gap between large and small companies is less pronounced in online payment systems and in offering SSL encryption for online shops. Surprisingly, online after-sales-services are offered by a higher share of small than of large companies. Small companies seem to use the Internet extensively to overcome some of the disadvantages of being small and offer superior customer care service online. However, large telecommunication companies in particular with very large numbers of customer relationships have an incentive to move to self-service systems on the Internet to achieve cost savings and increase customer satisfaction (see case study BT).

Online customer services at British Telecom

BT Group plc is the listed holding company for an integrated group of businesses that provide voice and data services in the UK and elsewhere in Europe. Its principal activities include local, national and international telecommunications services, broadband and Internet products and services, and IT solutions. In the UK, BT serves over 21 million corporate and residential customers with more than 28 million exchange lines, as well as providing network services to other licensed operators.

BT offers a wide range of online services for private customers and special products and services for enterprises.

After registration, private customers are enabled to find the most appropriate BT package for their typical usage patterns and order one of the BT lines. With "BT Online" customers can see their itemised bills online and receive an email when the next bill is available. They can view their running total and sort the calls by type, cost, number or name. The details can also be printed or downloaded.

Other services, which can be ordered online, are BT Broadband and BT Answer 1571 (BT´s free voice messaging service). Customers can also apply, register, download and install the dialler software for the Internet access "BT Together with 24/7". Furthermore BT offers the service "Mobile Sense". With "Mobile Sense" customers have the opportunity to buy mobile phones online and get an account at BT. As a Mobile Sense customers, customers receive an e-bill every month and are able to see and change the account details online.

For enterprises, BT offers several special services depending on the type of organisation. Companies can register for online services including online-bills, "Sample Bill" to consolidate bills and the "BT Billing Analyst", a downloadable software that helps businesses to control their telephony expenses.

Source: www.bt.com

Table 2-37: Barriers to selling online

Completely agreeing to statement	All sectors	ICT services			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
Few customers online	20.0	15.6	15.7	8.1	12.9
Customers hesitant to buy online	30.7	30.1	30.2	23.4	23.8
Goods / services do not lend themselves to selling online	47.4	45.9	45.9	53.2	44.9
Processing of payments for online orders is a problem	21.8	19.4	19.4	19.2	12.7
Technology too expensive	20.5	14.5	14.6	13.8	12.4
Revenue of online sales is still low	33.6	31.8	31.9	26.3	32.4
Delivery process causes problems	15.4	13.9	14.0	6.0	14.0
Adapting corporate culture to e-commerce is difficult	23.9	19.4	19.5	14.0	11.2
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises …". Computation base: all enterprises. Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

Similar barriers to selling online as in other sectors apply in the ICT services sector. Even though all barriers are slightly less important in ICT services than on average, the gaps are less pronounced than the sector's active use of e-business would suggest. The largest deviation from the average can be observed in expensive technology as a barrier to online sales. Since it is part of their core business, ICT services companies obviously know how to cost-effectively obtain the required technologies.

Goods and/or services that are not suitable for selling online are the most important barrier in ICT services as well as in other sectors. This reflects that even though in some sub-sectors of ICT services products and services are very well suited for being sold online (e.g. standard software or standard telecommunication services) this does not apply to other sub-sectors (e.g. IT consulting). The still limited revenue potential of online sales and the hesitant attitude of customers towards buying online are further important barriers in all sectors. While these three barriers are equally important to large and small companies, most other barriers are considered more important by small enterprises. For example, almost 20% of the small companies but only 13% of the large ones see payment processing of online orders as a problem. Similarly, almost 20% of the smaller ones regard the adaptation of corporate culture to e-commerce as a problem, while only 11% of the large ones do.

Figure 2-16: Major barriers to selling online across countries (in % of all enterprises)
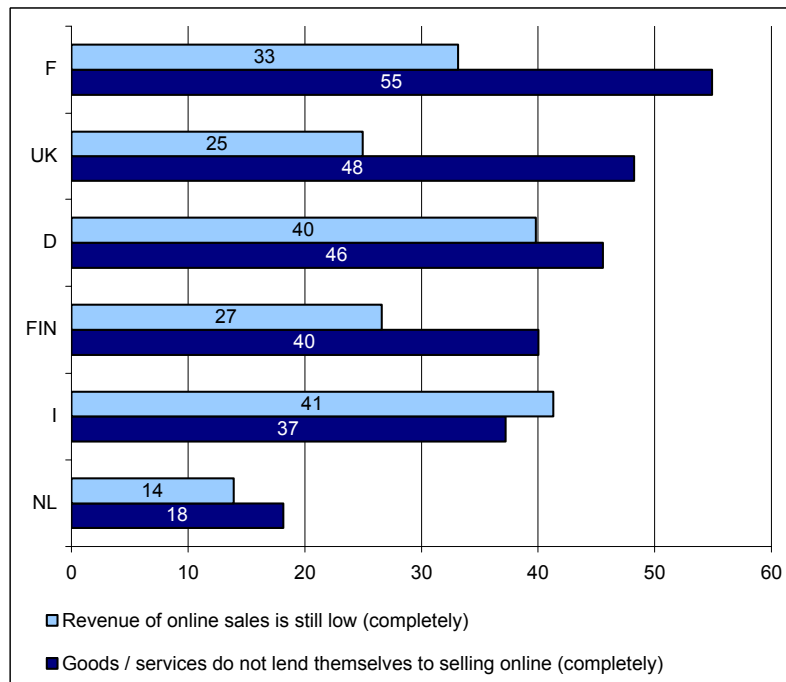
Source: e-Business W@tch (2002)

Surprisingly, the assessment of the suitability of the products and services for being sold online differs quite strongly between countries. While only 18% of the Dutch companies completely agree that goods and services do not lend themselves to selling online, 55% of its French competitors see this as a major barrier. While these different assessments might partly be due to a different sub-sector structure in each country they probably also reflect different attitudes towards e-commerce to a certain degree.

The assessment of low online revenues as a major barrier to selling online across different countries corresponds to the sell-side activities of these countries. As figure 2-14 above has shown, ICT services firms in Germany, France and Italy are least active in sell-side e-commerce, whereas Finland, the Netherlands and the UK have the largest shares of companies selling online.

Table 2-38: Impacts of selling online

Impact on…	Very positive	Fairly positive	Neither positive nor negative	Fairly negative	Very negative
Volume of sales					
ICT services	18.3	36.5	30.9	7.2	7.2
all sectors	19.8	37.4	35.4	5.6	1.8
Number of customers					
ICT services	19.3	36.8	29.2	9.6	5.2
all sectors	18	40	35.2	3.7	3.1
Sales area					
ICT services	19.7	36.9	29.0	9.5	5.0
all sectors	22.2	37.3	34	3.5	3.0
Customer care					
ICT services	22.1	37.4	32.0	3.8	4.7
all sectors	27.9	34.6	34.2	2.3	0.9
Efficiency of internal business process					
ICT services	24.7	34.4	30.4	4.6	6.0
all sectors	20.9	36.7	37.9	3.0	1.5
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises reporting…". Computation base: enterprises selling online (excl. DK/NA). Regional coverage: EU-4.					

Source: e-Business W@tch (2002)

In line with the findings above, the most important positive impacts of selling online in the ICT services sector are on customer care and on the efficiency of internal business processes. This again stresses the importance of an efficient handling of customer relationships in this sector, particularly in large companies.

However, table 2-38 reveals an interesting picture of the overall assessment of selling online in the ICT services sector: even though ICT services firms are more active in selling online than on average (compare table 2-31 above), its impacts are considered less positive than on average. A lower share of ICT services firms than on average considers the impacts of selling online on the volume of sales, on the number of customers, on the sales area, and on customer care as very or fairly positive. Similarly, a higher share of companies than on average feels fairly or very negative impacts of selling online. More than 14% of the ICT services firms that sell online, for example, believe that this activity negatively affects their volume of sales, the number of customers and their sales area. The only area that is considered slightly more positive in the ICT services sector is the impact of selling online on internal business processes.

This outcome can best be explained by the assumption that the enterprises surveyed not only mean the impact of their online sales activity on sales volume and other variables but the impact of online sales in general.

Table 2-39 reveals that the comparatively negative assessment of selling online in the ICT services sector results to a large extent from the negative opinion of small enterprises. For example, almost 15% of the small ICT services firms in the six countries surveyed feel negative impacts on their volume of sales and the sales area, while none of the large companies reported negative effects here. In addition, while around 70% of the large enterprises report that selling online positively affects their sales, the number of customers, as well as customer care and efficiency of internal business processes, only between 55% and 60% of the small ones do so.

Contrary to other sectors (e.g. chemicals), where small companies particularly profit from selling over the Internet, this does not seem to be equally true for the ICT services sector. Here it seems that online sales services help large companies to overcome the disadvantages of being large, e.g. handling very large numbers of customers or handling complex internal business processes. New e-

business technologies provide the larger companies with the means to personalize their services better and to become in general more customer-friendly, which was often a comparative advantage of small companies. In addition, the Internet helps large companies to strengthen their brand name and to exploit economies of scale.

Table 2-39: Impacts of selling online across company size classes

Impact on…	Very positive	Fairly positive	Neither positive nor negative	Fairly negative	Very negative
Volume of sales					
0-49 empl.	18.4	36.4	30.7	7.3	7.3
50-249 empl.	7.6	38.3	51.3	2.9	0.0
250+ empl.	18.3	53.4	28.3	0.0	0.0
Number of customers					
0-49 empl.	19.3	36.7	29.1	9.7	5.2
50-249 empl.	13.7	46.0	31.3	2.8	6.2
250+ empl.	21.2	38.7	36.7	0.0	3.4
Sales area					
0-49 empl.	19.4	37.1	28.8	9.6	5.0
50-249 empl.	33.9	15.1	50.9	0.0	0.0
250+ empl.	27.2	50.2	22.5	0.0	0.0
Customer care					
0-49 empl.	22.1	37.6	31.7	3.8	4.8
50-249 empl.	17.6	21.6	60.8	0.0	0.0
250+ empl.	25.7	43.5	30.5	0.2	0.0
Efficiency of internal business process					
0-49 empl.	24.6	34.4	30.3	4.6	6.1
50-249 empl.	24.9	29.4	45.7	0.0	0.0
250+ empl.	31.6	40.0	25.2	3.2	0.0
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises reporting…". Computation base: enterprises selling online (excl. DK/NA). Regional coverage: EU-6.					

Source: e-Business W@tch (2002)

3   Summary and conclusions

3.1   Summary of main findings

Economic profile

This *e-Business W@tch* report has analysed the use of ICT and e-business in the telecommunications (NACE 64.2) and the computer services (NACE 72) sectors.

Telecommunication services account for slightly more than half of value added in the ICT services sector of the EU-10, for about a third of the employees in the combined sector but for only 3% of the enterprises. This already shows that production and size structure in telecommunication services differ significantly from that in computer services.

Computer services produce value added of a similar size to telecommunication services, but in a totally different way. The average enterprise is considerably smaller than in telecommunication services and the production is significantly more labour-intensive. This explains why computer services companies employ about two thirds of all employees in the ICT services sector and make up for around 97% of all enterprises in this sector.

Telecommunication and computer services both showed a picture of healthy growth of production in the second half of the 1990s. This growth was well above GDP growth, implying an increasing importance of both sub-sectors for most European countries. Although growth between both sub-sectors was in sync in the first half of the observation period, growth in computer services accelerated in 1997/98, which marks the beginning of the Internet and e-commerce bubble.

ICT and e-business in the sector

Despite considerable differences between telecommunications and computer services, both sub-sectors have one thing in common: while they are potential users of e-business like every other industry they also provide some of the most essential elements for conducting e-business. One could, therefore, assume that the companies in these industries are conducting e-business in the best way possible, as they are familiar with concept and technology, and should be competent in realising e-business projects.

Results from the e-business watch survey confirm this picture of a sector for which e-business plays a comparatively important role: almost 80% of the respondents of the survey state that e-business constitutes a significant or some part for the way their company operates today. On average over all sectors this share is only at around 50%. At 17% the share of companies which state that e-business has significantly changed the way they conduct business is twice as high as on average.

As one would expect in a sector that focuses on information and communication technologies, the survey results also confirm that ICT services companies are noticeably better equipped with IT infrastructure than the average EU-4 company. Internet, E-mail and the WWW are standard features in every ICT services firm, regardless of its size. Those features are available to the majority of office workers in more than 90% of all ICT services companies.

The usage of online technologies for several internal business processes is significantly higher than in other sectors as well. For example, e-learning tools are used by 30% of ICT services firms but only by 12% on average. ICT services firms are faced with the challenge of constantly keeping their employees up-to-date with quickly changing technologies and technical innovations and online e-Learning tools can significantly help to support this process.

E-business tools to improve customer-faced processes are particularly important for those companies in the ICT services sector that deal with large numbers of customers. Overall, 22% of the ICT services firms apply customer relationship management (CRM) systems compared to only 7% on average over all sectors. Improving internal coordination as well as the flow and management of knowledge is vital

in those sub-sectors that produce their services mainly from skilled labour. Knowledge management systems are used by 17% of the ICT services companies compared to only 5% on average.

The ICT services sector is also very advanced in using online technologies to cooperate with external business partners. Almost all indicators in this area are considerably above average. The advance is strongest for online collaboration in the product design phase, for online negotiation of contracts as well as for having access to an extranet of business partners. The advanced state of online cooperation in the ICT services sector strongly facilitates the division of labour in this sector.

The use of online e-marketplaces is also above average in the ICT services industry, although ICT services companies define e-marketplaces more broadly than is done generally. More than twice as many companies as on average use e-marketplaces right now and almost three times as many than on average plan to do so in the future. There exist, for example, bandwidth marketplaces for telecommunications, software-related marketplaces for expert knowledge as well as for freelance work, and finally intermediaries for software, research, and similar non-physical products.

The fraction of ICT services companies already purchasing goods or services online is extraordinarily high (81%). Both sorts of inputs, direct as well as indirect MRO goods, are purchased online to a larger extent than on average over all sectors. This can be explained by the preconditions for buying online being very good in the sector. Firstly, many inputs necessary for the provision of ICT services can easily be bought on the Internet. This applies to software, hosting services, Internet and telecommunication services, office supplies, books, database content, research, etc. And secondly, the familiarity of ICT service companies with the possibilities of the Internet as well as the suitability of many intangible inputs for electronic delivery make online ordering a logical thing to do. In addition, potential barriers to online purchasing are generally of lesser importance in the ICT services sector than across all industries.

On the sales and marketing side, ICT services companies make sophisticated use of their websites as marketing tools and usually go beyond the pure listing of activities and services. Consulting firms, for example, make considerable amounts of research available on their sites and in this way transform their websites into knowledge portals for their areas of specialisation. Software manufacturers, as another example, regularly offer trial versions of software with only limited functionality and offer web shops where their products are available for direct download.

22% of all companies in the ICT services sector already sell products and/or services online and an additional 18% plan to do so over the next 12 months. If these plans materialise, twice as many companies in the ICT services sector will sell online one year from now than on average over all sectors.

As one would expect, ICT service companies that sell online have more sophisticated online order processing systems in place than companies from other sectors. For example, in 24% of the ICT services firms online orders are fully integrated with the backend systems (all sectors: 9%), 43% have online payment systems implemented (all sectors: 31%), and 65% offer online after-sales-services (all sectors: 49%).

ICT and e-business in large and small companies

Contrary to the overall economy, where e-business is less important for small enterprises, e-business is of particular importance for small companies in the ICT services sector. Only 19% of the small companies in this sector do not ascribe any role to e-business but 34% of the large ones do. The share of e-business sceptics is also lowest in the small enterprise segment of the ICT services sector. While on average over all sectors large enterprises are perceived to be the main beneficiaries of e-business, nearly half of all companies in the ICT services sector believe that large and small enterprises can equally benefit from e-business.

The IT infrastructure in small ICT services companies is significantly better than in small companies from other sectors. While there is still a gap between large and small companies this gap is significantly smaller than in other sectors. For example, small ICT services firms predominantly use broadband connections to access the Internet. Two thirds of them uses DSL or other fixed lines while

only one third of the small companies in other sectors does. Technologies that are often less suitable for small enterprises such as extranets or WANs are more frequently used by large ICT services companies. Similarly, certain IT solutions that are of much higher value for large enterprises show higher usage rates in the large enterprise segment. CRM systems, for example, are of much higher value for large enterprises with very large numbers of customers, e.g. telcos, than for small, e.g. IT consultants, which can easily handle their comparatively few customer relationships manually.

While on cross-industry average, large companies are more active in online purchasing, in ICT services there is no difference between the fraction of large and of small companies that purchase online. Purchasing online even seems to be of special importance for small companies: For 42% of those small companies buying online, these online purchases constitute more than a quarter of their total purchases. The same value for large companies is at only 3%. This outcome points at substantial differences between online buying of small and large companies. While small companies mostly buy manually using the Web, larger companies tend to use more sophisticated procurement solutions to order within pre-established contracts.

On the sell-side, however, a gap in the online activities of large and small ICT services companies can currently be observed: only 22% of the small but 36% of the large companies in the sector sell online today. This gap will close, though, since 18% of the small but only 6% of the large companies plan to implement online sales systems within the next 12 months. If these plans materialise, the medium sized companies will fall back behind their smaller and larger competitors.

There are some significant differences in the processing of online orders between large and small companies, though. In more than three quarters of the large companies that sell online, online orders are fully integrated with backend systems. The same is true for only 23% of the small and 15% of the medium sized ICT services firms. In SMEs, incoming online orders often simply generate an automatic e-mail informing about the order. Surprisingly, online after-sales-services are offered by a higher share of small than of large companies. Small companies seem to use the Internet extensively to overcome some of the disadvantages of being small and offer superior customer care service online.

3.2   Economic Implications

The use of e-business in ICT services has implications for individual enterprises as well as for the industry as a whole. Implications result from a broad range of e-business solutions used in this sector. However, quantitative data on the effects are not available for all elements of e-business. While the *e-Business W@tch* survey provides information on the impacts of online purchasing and online selling, the effects of internal e-business projects (e.g. the introduction of e-learning or of knowledge management systems) as well as from rather specific B2B solutions like supply chain management systems or EDI can only be discussed qualitatively.

For those quantitative results available, it has to be kept in mind that the survey has been conducted with IT managers – the respective managers in sales or procurement departments or the head of company might evaluate the impacts differently.

3.2.1   Implications for individual enterprises

In the first *e-Business W@tch* report on ICT services we suggested that this sector might be already a sophisticated user of e-business due to its familiarity with concept and technology. Indeed the survey results show an above average usage of many e-business technologies in the ICT services sector. Surprisingly, however, the impact of this use and thus the implications of e-business for individual enterprises do in most cases not reflect this higher usage.

Internal processes

While ICT services companies are comparatively well-equipped with IT and are also selling and purchasing online to a larger extent than the average EU-4 company, there are only very few areas where the impact of buying and selling online is considered positive by more enterprises than on average over all industries.

One of these areas considered relatively positive is the impact of e-selling and e-purchasing on internal business processes. 59% of the ICT services companies state that selling online has affected their internal business processes very or at least fairly positively. 71% state the same for purchasing online. This result seems to be surprising at first sight, as the ICT services industry contains many small enterprises, which tend to use rather unstructured ways of buying and selling online rather than implementing sophisticated procurement or integrated sales solutions. An explanation for the nevertheless positive impact on internal processes might be that already the reduction of paperwork is considered as a relief, as it allows them to speed up internal processes. For online purchasing in particular, this process improvement for a typical small company is obvious. Buying software, for example, can be done by making the purchasing decision, clicking on the appropriate item in the favourite online shop, and entering the firm's credit card number. The software can be often be downloaded and installed immediately. Comparing this process to a traditional telephone and catalogue order or even physical shopping clearly shows a much shorter process. In addition, typical ICT services companies are small enough not to have tremendously complicated systems for controlling corporate procurement. Thus, "improvements of internal processes" should be interpreted as a speeding-up of processes, rather than as making them more structured and well-organised.

Large companies, on the other hand, typically use more sophisticated systems that in addition to speeding up the processes also structure them more efficiently. And indeed large enterprises in the ICT services sector consider the impact of e-purchasing and e-sales more positive than small ones. 72% state that selling online had a positive effect on their internal business processes and 79% say the same about purchasing online.

The survey does not provide quantitative information on the impact of other e-business solutions on internal processes. However, the usage numbers are an indication for the usefulness of such solutions. They seem to provide significant value added for the ICT services sector. When early adopters in the sector make use of them to make internal processes more efficient, competitive pressure also forces the remaining companies to employ such tools.

Buy-side

Major arguments in favour of online procurement have always been, firstly, savings in processing costs through increased efficiency and, secondly, lower prices for products by contracting with new suppliers. And indeed, ICT services companies have achieved such results. 62% indicate a positive impact of purchasing online on their procurement costs, and 33% indicate that their number of suppliers has increased. While the survey does not provide an explicit distinction between product and process cost savings, both are probably present. The larger number of suppliers points to product cost savings resulting from finding better and cheaper suppliers and the highly positive effect of online purchasing on internal processes points to process cost savings.

Interestingly, 54% of ICT services companies indicate that online purchasing has improved the relationship to their suppliers, while this is only the case for 45% on average over all industries. This might also reflect the peculiarities of the ICT supply chain – especially for direct inputs. While in other sectors, e.g. in manufacturing, suppliers often compete with almost identical products to a large extent on price, ICT service companies are using fewer standardised bulk inputs. Thus, suppliers need to have less fear that online procurement is mainly a means to squeeze their margins, but rather use online selling as a tool to provide better customer service. This benefits both parties and should thus improve the relationship between both.

Sell-side

As the first report on ICT services has shown, many of the most promising applications in this sector are on the customer side of companies. Employing e-business tools to improve customer-faced processes such as customer service, sales and marketing is very important for those parts of the industry that deal with large numbers of customers. But smaller companies also have ways to benefit: new ways of marketing include the increasing use of the companies' website to provide material beyond pure service descriptions. Trial versions of software, research documents or white papers can particularly help smaller companies in these sectors to overcome trust problems, which are typical for experience goods like services and software. Small companies in particular feel negative impacts of selling online.

Taking these opportunities for ICT services into account, however, it is rather astonishing that the impact of selling online is considered less positive than on average over all sectors. A higher share of companies than on average even feels negative impacts of selling online. More than 14% of the ICT services firms that sell online believe that this activity negatively affects their volume of sales, the number of customers and their sales area.

This outcome can best be explained by the assumption that the enterprises surveyed not only mean the impact of *their* online sales activity on sales volume and other variables but the impact of online sales *in general*. Small and relatively unknown enterprises, for example, for which personal service used to be a major value proposition, now have to compete with an increasing number of larger companies online that are marketing their products via their brand. New e-business technologies provide the larger companies with the means to personalize their services better and to become more customer-friendly, thus reducing the comparative disadvantage to small companies in respect to this issue.

3.2.2   Implications for the industry

Cost savings and better processes due to e-business should decrease ICT services prices

The ICT services sector in its current form is still a relatively young sector — many companies and production technologies also are. It is, therefore, safe to assume that there is still significant potential for achieving productivity gains by improving processes in this sector. The above average usage of ICT and e-business will help to support this process. As a result of more efficient production processes, ICT services should become cheaper in the long-term.

Due to the specific role of the ICT sector as provider of major building blocks of the information society all sectors should benefit from these improvements. As ICT services (especially software) are to a large extent responsible for productivity improvements in other sectors, higher demand for such services due to lower prices should induce productivity increases in the whole economy.

Concentration tendencies reinforced by online selling possibilities

Telecommunications and some forms of IT outsourcing are infrastructure businesses with strong economies of scale. Economies of scale benefit concentration in an industry as average costs are decreasing with the number of customers, thereby giving large firms a cost advantage. In addition, in standard software production and in telecommunications the network effect (usage utility increases with the number of users of the product) aggravates the concentration forces. The emergence of internationally known brands can have a similar effect.

E-business in general and e-commerce conducted via the Internet in particular reinforce these effects. Firstly, many e-business applications, such as CRM or ERP systems, additionally imply economies of scale for large companies. Secondly, the Internet facilitates world-wide distribution and thus increases the possibilities to distribute costs over an even larger number of customers. The existence of concentration forces is reaffirmed by the survey results that indicate clearly positive effects from online selling for large companies but a rather polarised assessment by small companies.

However, small niche companies that follow a strategy to become market leaders in their niche can profit as well. They can benefit from economies of scale by employing the potential offered by online sales technologies. Companies that rather follow the traditional strategy of compensating volume with personal relationships to their customers risk losing market share as personalisation technologies also permit online sellers to offer strongly personalised services.

ICT facilitates greater specialisation and cooperation

As technologies and models for online cooperation become more sophisticated, specialisation of smaller companies and cooperation on ICT projects should increase further in importance. In particular if services can be delivered in electronic form, enterprises can offer their services on a worldwide scale, making very focused specialisation still profitable. The decrease in costs for cooperation also allows even very small and specialised companies to work together with others on larger projects.

The increasing popularity of the Open Source development model and the spread of IT tools to facilitate cooperation in these projects shows that individual specialists can successfully cooperate on larger projects. The survey results indicate that online cooperation is indeed very advanced in the ICT services sector. Thus, there is a tendency for an increase in the division of labour in this sector. This is further supported by the possibility to combine electronic services from different sources on the fly to a single offer for the customer, as is done frequently in outsourcing and telecommunications.

3.3   Policy issues

The economic implications for individual enterprises in ICT services as well as those for the entire sector lead to a number of policy issues. Three policy areas are listed below that require specific care and potentially appropriate policy measures.

One policy size does not fit all

The companies in ICT services are rather diverse with respect to their products, business processes, distribution by size class, and value chains. A telecommunication company, for example, differs from a software consultancy in many ways which go beyond the typical size differences. This diversity is also reflected in the companies' motivation for engaging in e-business activities as well as in the different priorities attached to the various possibilities. While a large telecommunications company for example might want to improve the customer interface by personalised online selling and customer care, a small software manufacturer might be more interested in employing cooperation tools to improve its work with freelancer programmers or in purchasing inputs online to avoid paperwork and lengthy telephone calls.

This implies that different sub-sectors of ICT services as well as companies from the same sub-sector but of different size will follow different "optimal" e-business strategies. This has implications for measurement as well as for policy. Differences in the usage of certain types of e-business solutions might reflect different optimal strategies rather than reflecting different states of "e-readiness". Or, following a saying from the software industry, these differences "are a feature, not a bug."

For policy it has the implication that policy measures targeted at improving the usage of e-business should aim at closing the gap between best practice enterprises and laggards *within* the relevant peer group rather than across groups of enterprises.

Concentration tendencies need observation

It has already been pointed out that the special characteristics of production in ICT services tend to favour concentration, particularly in infrastructure-like sub-sectors such as telecommunications and – to some extent – outsourcing as well as in software production. While these tendencies are not caused by the emergence of e-business-technologies, they are reinforced by them. Online selling, for example, allows large companies to leverage their brand even further and technologies for managing

large amounts of customer data efficiently help to overcome typical inefficiencies of large enterprises. Hence, they weaken counterforces to the exploitation of economies of scale.

While concentration tendencies do not necessarily imply problems for competition, circumstances might evolve where this changes as, for example, the competition policy debate concerning Microsoft shows. They therefore require continuous observation and monitoring as well as sophisticated anti-trust frameworks, if concentration is considered to be detrimental to competition. Such a framework must take into account the peculiarities of the ICT services sector, especially its highly dynamic nature.

ICT Services might serve as a role model

The *e-Business W@tch* survey has shown that ICT services are rather advanced in usage of ICT and e-business technologies. Due to their double role as users and providers of this technology, they tend to be early users. This early usage might provide interesting insights for the appropriate use of these technologies in other, related sectors. Such sectors can be, for example, media and publishing with respect to experiences from distributing immaterial goods, business services with respect to experiences from cooperation in distributed networks of experts, or consumer-oriented sectors with respect to the telecommunication sectors' experiences from managing significant amounts of customer interactions and data. There exist several examples, such as the Open Source programming model or the possibility to download trial software, where the ICT services sector has been lead user of new forms of production and distribution. In addition, small companies in this sector are advanced users of ICT and e-business and can therefore serve as role models for small companies in other sectors, which often fall back behind their larger competitors with respect to e-business.

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Annex: Methodology of the e-Business Survey 2002

Background

The data presented in this report are derived from the European e-Business Survey 2002, a cornerstone of the monitoring activities of the *e-Business W@tch.* In total, 9,264 telephone interviews with decision-makers in European enterprises in all EU Member States were conducted during June and July 2002. For the construction of the questionnaire and for underlying definitions, OECD recommendations were taken into account.

Fieldwork

The fieldwork of the survey was carried out by INRA Germany in co-operation with its partner organisations on behalf of the *e-Business W@tch*:

Country	Organisation		Country	Organisation
Austria	Spectra Marktforschung: Brucknerstr. 3-5/4, 4020 Linz		Italy	INRA Demoskopea S.p.A.,Via Rubicone 41, 00199 Roma
Belgium	INRA Belgium, Avenue de la Couronne 159-165, 1050 Brussels		Luxembourg	ILReS Market Research, 46, Rue di Cimentière, L-1338 Luxemburg
Denmark	Gallup TNS Denmark, Masnedogade 22-26, 2100 Copenhagen		Netherlands	Blauw Contactcenter, Conradstraat 18, 3013 AP Rotterdam
Germany	INRA Deutschland GmbH, Papenkamp 2-6, 23879 Mölln		Portugal	Metris GfK, Av. Eng. Arantes e Oliveira 3-2, 1900-221 Lisboa
Finland	Taloustutkimus Oy, Lemuntie 9, 00510 Helsinki		Spain	INRA España S.A., C. Alberto Aguilera, 7-5, 28015 Madrid
France	CSA TMO, 22 rue du 4 Septembre, 75065 Paris Cedex 02		Sweden	GfK Sverige, Box 401, 221 00 Lund
Greece	MEMRB – K.E.M.E, 24 Ippodamou St., 11635 Athens		UK	Continental Research, 132-140 Goswell Road, EC1V 7DY London
Ireland	Lansdowne Market Research, 49 St. Stephens Green, Dublin 2			

Interview method

The fieldwork was carried out in June and July 2002 using computer-aided telephone interview (CATI) technology. The decision-maker in the enterprise targeted by the survey was normally the person responsible for ICT within the company, typically the IT manager. Alternatively, especially in small enterprises without a separate IT unit, the managing director or owner was interviewed.

Population coverage and sampling

The highest level of the population for the e-Business Survey was the set of all enterprises which are active at the national territory of one of the EU Member States and which have their primary business activity in one of the 15 sectors specified by NACE Rev. 1 codes. The most important used viewpoints for breakdown of the population in the survey were (i) the economic activity, (ii) the national territory of the enterprise and (iii) the size in terms of employees. The survey was carried out as an enterprise survey, i.e. data collection and reporting focuses on the enterprise (rather than on the establishment), defined as a business organisation of one or more establishments comprised as one legal unit.

The sample included enterprises from 15 sectors of the economy, defined by NACE Rev. 1 business activities (see table below). The composition of sectors took into account their economic importance, homogeneity with respect to the analysis of e-business, and the relevance of e-business activities.

No.	\	NACE Rev. 1 Codes (Section – Division/Group)	Sector Name
			Population coverage of the e-Business Survey (2002)
01	D	15, 16	Manufacture of food products, beverages and tobacco
02	D / O	22, 92.1, 92.2	Publishing, printing, reproduction of recorded media, audiovisual services
03	D	24, 25	Manufacture of chemicals and chemical products
04	D	28	Manufacture of metal products
05	D	29 *(except 29.6, 29.7)*	Manufacture of machinery and equipment
06	D	30, 31 *(except 31.3 - 31.6)*, 32	Manufacture of Electrical machinery and electronics
07	D	34, 35	Manufacture of transport equipment
08	G	52.11, 52.12, 52.4	Retail
09	H / I / O	55.1, 55.2, 62.1, 63.3, 92.33, 92.52, 92.53	Tourism
10	J	65.12, 65.2	Credit institutions, investment firms and leasing enterprises
11	J	66	Insurance and pension funding services
12	K	70	Real estate activities
13	K	74	Business services
14	I / K	64.2, 72	Telecommunications and computer-related services
15	N	85.11, 85.12, 85.3	Health and social services

The sample drawn was a random sample of companies from the respective sector population in each Member State where the respective sector was to be surveyed with the objective of fulfilling quota with respect to company size class. Target quota were to include a share of at least 10% of large companies (250+ employees) per country-sector cell and at least 30% of medium sized enterprises (50-249 employees). Samples were drawn locally by the INRA partner organisations based on the following business directories and databases:

Country	Directory / Database		Country	Directory / Database
Austria	Herold BUSINESS MARKETING database		Italy	Dun & Bradstreet
Belgium	SPECTRON database by Vicindo		Luxembourg	Rèpertoire des entreprises luxem-bourgeoises" by STATEC (the official list of the National Statistic Administration).
Denmark	KOB (Købmandsstandens Oplysnings Bureau)		Netherlands	MarktSelect
Germany	Heins und Partner Business Pool		Portugal	Business directory by INE (the National Statistics Institute)
Finland	Blue Book - Salesleads database by the Helsinki Media Company Oy (Sanoma Magasines Finland)		Spain	Dun & Bradstreet
France	IDATA, based on „INSEE Siren file" (the National Institute of Statistics) and other directories		Sweden	Swedish Post Address Register (PAR)
Greece	ICAP directory (the major database for Greece and member of the European Association of Directory and database Publishers)		UK	Dun & Bradstreet
Ireland	Bill Moss / Dun & Bradstreet			

Interviews per country and average interview length

In total, 9,264 interviews were carried out. The following table shows the breakdown by country and the average interview length:

Country	No. of interviews	Average length	Country	No. of interviews	Average length
Austria	308	17.0 min.	Italy	1517	22.5 min.
Belgium	300	18.2 min.	Luxembourg	102	17.4 min.
Denmark	304	20.2 min.	Netherlands	500	17.2 min.
Germany	1500	18.8 min.	Portugal	300	23.0 min.
Finland	308	20.6 min.	Spain	502	18.4 min.
France	1362	17.2 min.	Sweden	260	19.8 min.
Greece	308	16.5 min.	UK	1538	16.5 min.
Ireland	155	20.1 min.	**TOTAL**	**9264**	**~ 18 min.**

Problems encountered

No major problems were reported by the fieldwork organisations with respect to interviewing (e.g. comprehensibility of the questionnaire, logical structure). A statement from the institute that carried out the survey in the UK summarises this general assessment very well: "On the whole, the fieldwork went relatively smoothly. The questionnaire was logically structured and flowed naturally. Most problems stemmed from the difficulties of conducting research projects among ICT decision makers in general rather than from any specific flaws in design of this project itself. Dedicated ICT professionals are heavily researched and therefore securing their participation can be difficult. This is a particular problem in larger companies."

In some countries, it was not possible to accomplish the number of interviews envisaged, mainly in those cases where the total population of enterprises was relatively small (e.g. in the insurance sector in smaller countries). In some cases, the objective of including a share of 10% of large companies could not be accomplished; if possible, these were then replaced by interviews with SMEs.

An issue – which was known in advance but is unavoidable in telephone interviews – is that it is not always easy to find the right target person. Fieldwork organizations reported that sometimes a data processing manager is not very aware of the consequences of e-business on the whole of the company, on the personnel level and on the financial level. On the other hand, the general manager may not always be aware of the implementation status and technical consequences.

Tabulations

Within the coverage specified above, and in line with the special task of the *e-Business W@tch*, results were compiled for mainly two sets of data:

1. An activity breakdown of the population of enterprises into 15 sectors. This breakdown is based on the aggregate of four countries (D, F, I, UK), as in these countries all 15 sectors were included in the survey and therefore comparability of the sample is given. These four countries represent more than 60% of the market volume in any of the 15 sectors and in most sectors actually more than 70%.

2. A size-class breakdown of the population of enterprises into three categories: small enterprises (including micro-enterprises, i.e. enterprises with 0-49 employees), medium sized enterprises (50-249 employees) and large enterprises (250+ employees).

A breakdown of the population by EU Member States is also available, but it is restricted to four countries (D, F, I, UK) for the same reason as explained in (1.) above. This implies that two different kinds of totals were calculated: (i) an EU-4 total consisting of the results from Germany, France, Italy and the UK and (ii) a sector total consisting of all countries included in the survey of a particular sector. For reasons of comparability and consistency, the tables in this scoreboard build on the EU-4 totals. Sector totals are composed of 6-8 countries per sector.

(cf. databases on http://www.empirica.com/marketwatch/database/sector_database.htm)

In addition, the activity breakdown was cross-tabulated with the country as well as with the size-class breakdown. These cross-tabulations are offered in special sector databases. However, depending on the indicator and the filter questions, the number of observations can become very small in many cells of this cross-tabulation. It is therefore recommended to limit the breakdown of data to one dimension (in the case of pre-filtered questions) or two dimensions (if all enterprises were asked).

Weighting principles

Two weighting schemes have been applied: weighting by employment and by the number of enterprises. Data are presented in either way depending on the kind of the analysis to be made.

- Values that are reported as employment-weighted figures should be read as "enterprises comprising x% of employees". To give an example: The indicator "*percentage of companies selling online*" is – if employment-weighted – defined as "companies comprising x% *of employees sell online*". The reason for using employment-weighting is that there are very many more micro enterprises than non-micro enterprises. The unweighted figure would effectively represent mainly the smallest sizes of firm.

- Values that are reported as enterprise-weighted figures are to be read as "x% of enterprises", reflecting the number of enterprises as legal entities but not their relative economic importance in terms of employment.

Weighting was based on the latest available universe figures by Eurostat. Missing or undisclosed universe data had to be imputed. The imputation procedures depended on auxiliary or proxy data availability, taking into account information, where available, about higher industry aggregations, nearest neighbour data, turnover-employment correlation and secondary sources other than Eurostat and allowed for the constraint of predetermined ranges such that imputed data had to be contingent with published sectoral, national and European universe totals as well as for final plausibility checks for every single imputed data item. The weighting cells correspond to the data reporting pattern used as regards industries and employment size-classes. Uniform expansion factors are applied to enterprises within one of the three size-classes per industry per country. As for data that refer to a base other than the universe of all enterprises (e.g. indicators appropriately reported for on-line selling enterprises only), expansion factors are adjusted to the different shares of observations per cell that build the computation base.

Variables - indicators

The set of ICT and e-business indicators for which data were collected in this survey can be structured into five main modules:
- Module A: ICT infrastructure and e-skills development in the company
- Module B: E-commerce and e-business usage
- Module C: Barriers to e-commerce
- Module D: Impact of selling and procuring online
- Module E: Impact of and satisfaction with electronic business

The choice of indicators includes a basic set of widely accepted measures for e-commerce and e-business (as used in related surveys on e-commerce and e-business e.g. by Eurostat), but also introduces a few innovative indicators which have a pilot character and are not yet widely tested. The full list of variables which was the basis for preparing the questionnaire can be downloaded (in *.xls format) from the *e-Business W@tch* website at its "database" section:

http://www.ebusiness-watch.org/marketwatch/database/survey_info.htm