Sector Report: *No. 08-I, May 2004*

Electronic Business in the ICT Services Sector

*The quantitative picture:
Diffusion of ICT and e-business in 2003/04*

e-business w@tch

European Commission

Enterprise publications

The *e-Business W@tch*

The European Commission, Enterprise Directorate General, launched the *e-Business W@tch* to monitor the growing maturity of electronic business across different sectors of the economy in the enlarged European Union and in EEA countries. Since January 2002 the *e-Business W@tch* has analysed e-business developments and impacts in 17 manufacturing, financial and service sectors. Results are continuously being published on the Internet and can be accessed or ordered via the Europa server or directly at the *e Business W@tch* website (www.europa.eu.int/comm/enterprise/ict/policy/watch/index.htm or www.ebusiness-watch.org).

This document is the first Sector Impact Study on the ICT Services Sector published in the 2003/04 period. It presents the results of the e-Business Survey 2003 (for more information about the survey, see annex on methodology). The second study on this sector (to be published in August 2004) will analyse in more depth specific issues which are most relevant for this sector, feature case studies and draw conclusions on business implications of the empirical findings presented in this report.

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Introduction to the *e-Business W@tch*

The *e-Business W@tch* – observatory and intermediary since late 2001

The *e-Business W@tch* monitors the adoption, development and impact of electronic business practices in different sectors of the European economy. The eEurope 2002 Action plan provided the basis for targeted actions to stimulate the use of the Internet for accelerating e-commerce, acknowledging that "electronic commerce is already developing dynamically in inter-business trading […]" and that "it is important for SMEs not to be left behind in this process […]." The eEurope 2005 Action Plan, endorsed by the Seville European Council in June 2002, confirmed and built further upon these objectives with Action 3.1.2. "A dynamic e-business environment", which defined the goal "to promote take-up of e-business with the aim of increasing the competitiveness of European enterprises and raising productivity and growth through investment in information and communication technologies, human resources (notably e-skills) and new business models".

It is against this background that the European Commission, Enterprise Directorate General, launched the *e-Business W@tch* in late 2001, with the objective to provide sectoral analysis based on sound empirical research, including annual enterprise surveys in all countries of the enlarged European Union. Special emphasis is placed on the implications for SMEs.

Since its launching, the *e-Business W@tch* has published e-Business Sector Studies on 17 sectors of the European economy, two comprehensive synthesis reports about the status of electronic business in the European Union, statistical pocketbooks and further resources (newsletters, presentations, special issue reports). These are all available on the website at www.ebusiness-watch.org.

The quantitative analysis about the diffusion of ICT and e-business is based to a large extent on annual, representative surveys among decision makers of European enterprises. The 2002 survey included 9,264 enterprises from the 15 EU Member States. In 2003, the regional scope of the survey was extended to the EEA and Acceding Countries, with about 10,500 companies in total.

Survey results confirm the initial assumption and rationale of the *e-Business W@tch* that the sector in which a firm operates and the size of a company are main determinants of its e-business activity, rather than the location of a company. The large demand for the various publications and statistics provided by the *e-Business W@tch*, and their exploitation by other research institutions (for example, in the EITO Yearbook 2003 and in the OECD Information Technology Outlook 2004), documents that there has clearly been a demand for sectoral e-business analysis.

Facilitated by positive responses and the growing interest in its analysis, the *e-Business W@tch* is increasingly developing from an observatory into a think-tank and intermediary, stimulating the debate about the economic and policy implications of e-business among stakeholders at an international level.

The wide-angle perspective: the *e-Business W@tch* provides the "big picture" as a basis for further research

The mission of the *e-Business W@tch* is to present a "wide-angle" perspective on e-business developments and practices in the sectors covered. This has important implications regarding the level of detail in which various issues can be explored, both in terms of the quantitative picture (survey) and in terms of the qualitative assessment and background research.

Over the past 10 years, "electronic business" has increased from a very specific to a very broad topic to be studied. The OECD defines e-business in 2004 concisely as "automated business processes (both intra-and inter-firm) over computer mediated networks". This definition is useful as it makes clear that e-business is more than e-commerce (which focuses on commercial transactions between companies and their customers, be it consumers or other companies) and that e-business includes

internal processes within the company as well as processes between companies. Furthermore, the OECD definition implicitly indicates that the focus and main objective of electronic business is to be found in business process automation and integration and the impacts thereof.

This implies that the potential scope for e-business analyses has also broadened. The measurement of e-commerce transactions (the volume of goods and services traded online) can and should be complemented by studies analysing the degree to which business processes, including intra-firm processes, are electronically linked to each other and have become digitally integrated.

In such a context, it becomes practically impossible to cover in depth all areas and facets of e-business in one study. The scope of such a study needs to be carefully defined and – as in photography – it must decided whether to "zoom in" or to use a "wide-angle" perspective. 'Zoom-in' studies investigate one specific aspect of electronic business in much detail. 'Wide-angle' studies adopt a broader perspective and investigate more issues at the same time, which necessarily puts limits to the level of detail in which each single issue can be explored. This must be considered when using this series of Sector Studies prepared by the *e-Business W@tch*. The second series of these Sector Studies (to be published in August 2004) will investigate and analyse specific issues in more detail also taking into account feedback from a number of case studies.

The role of economic analysis in the Sector Reports

The first chapter of each *e-Business W@tch* Sector Study provides background information on the respective sector. This overview includes the definition of the sector (on the basis of NACE Rev. 1 classification), some basic industry statistics, as well as information about the latest trends and challenges concerning the specific sector.

It appears that this practice, combined with the growing interest in the *e-Business W@tch* analysis, has caused some confusion: Some readers mistakenly consider that an *e-Business W@tch* "sector report" is a piece of economic research on the sector itself, and not a report focussing on the use of e-business in that particular sector. It is, therefore, necessary to underline that, while some background information is provided in order to better understand the context and the economic impact of e-business, the *e-Business W@tch* reports are neither intended nor could substitute more detailed and specific industrial analysis and statistics on each particular industry.

The same applies to the industry statistics presented in this first, introductory chapter of the *e-Business W@tch* reports. These data are mainly derived from official statistics prepared by Eurostat. However, in order to close the many gaps in the official statistics, DIW Berlin imputed missing data based on extrapolations and their own calculations. The *e-Business W@tch* cannot go beyond the presentation of this consistent set of statistics in the context of its principal assignment.

The mission of the *e-Business W@tch* is to monitor, analyse and compare the development of e-business in different sectors of the European economy – not the sectors themselves. Its objective is to provide reliable results, based on commonly accepted methodologies, which are not readily available from other sources and would trigger the interest of policy-makers, researchers, and other e-business stakeholders for more in depth analyses (or statistical surveys). The *e-Business W@tch* has adopted a 'wide-angle' perspective in its approach and the necessary trade-offs are transparently depicted in all its deliverables.

The definition of sectors and the adequate level of aggregation

Economic sectors constitute the main level of analysis for the *e-Business W@tch*. In 2003/04, the sample consists of ten sectors. Their configuration and definition are based on the NACE Rev. 1 classification of business activities. The aggregation of various NACE divisions and groups into a "sector" was guided by the aim to produce results which are relevant for the dynamics of the economy as a whole as well as with the intention of covering the most important features of e-business provision and adoption in Europe. The configuration of sectors partly followed aggregations that are also used in the "Panorama of European Businesses" published by Eurostat.

In the context of its 'wide-angle' perspective, the *e-Business W @tch* analysis is covering a large part of the European economy rather than focusing on very specific (sub-)sectors. Therefore, the statistics presented in these reports need to be carefully treated when making comparisons between countries and, occasionally, companies' size-classes. Against the previously described background, some generalisation and approximation has to be accepted, while the definition of sectors could be revisited during the implementation of the *e-Business W @tch*.

The 10 sectors analysed in 2003/04

The 10 sectors which are being monitored and studied in 2003/04 include eight sectors that were already covered in 2002/03 (thus allowing the continuous monitoring of changes and progress), as well as two new ones (namely the textile, clothing and footwear industries and the craft and trade sector). The regional coverage has been extended to the EEA (European Economic Area) and the Acceding Countries.

Exhibit: Sectors covered by the e-Business W@tch in 2003/04

Textile, clothing and footwear industries	The textile and footwear industries account for about 5% of total value added in manufacturing in the EU-15 and about 9% of employment. SMEs and co-operative SME networks are playing a vital role.
The chemical industries	ICT and the Internet in particular have fuelled the globalisation of markets for chemical products. E-business may have considerable future impact on this sector which accounts for ~15% of the production value of EU manufacturing.
The electrical machinery and electronics industries	The electronics industry is very suitable for e-business because of the high degree of standardisation of products, globalisation of production, and specialisation of firms along the value chain. Its dynamic development calls for continuous monitoring.
The manufacture of transport equipment	The transport equipment industries are precursors for economic development in Europe. Large companies are forerunners in using e-business, with considerable implications for all stakeholders in the value chain.
Craft & trade	The craft sector, which includes firms with less than 50 employees from a number of business activities, is vast, in terms of number of enterprises, employment and value added. E-business may become crucial in order for many craft firms to stay competitive with industrial production.
Retail	The retail sector represents a cornerstone of economic activity within Europe, with around 3 million retail enterprises currently in the EU, employing nearly 14 million people. As there is still untapped potential, ICT may eventually have major implications for the retail value chain.
Tourism	Tourism employs about 8 million people and is one of the fastest growing sectors in the European economy. SMEs play a very important role: 99% of firms employ fewer than 250 individuals. In some respects, the tourism sector has always been a forerunner in using ICT. E-commerce is exerting a huge impact on the sector, challenging intermediaries.
ICT services	The ICT services sector in many respects is the leading sector, and thus acts as a kind of benchmark with respect to e-business application. E-business can change the nature of ICT services, which has important implications for other sectors which use them.
Business services	Business services are a huge sector, involving more than two million enterprises – 99% of which are SMEs – and employing close to 13 million people. ICT and e-business have significant implications for those areas of the business services sector that are based on information and knowledge.
Health and social work	As national health systems suffer from increasing costs and political pressures to constrain these, it is hoped that strategies for the development of an e-health and e-business infrastructure will become key drivers of change.

Rationale for the selection of sectors to be monitored in 2003/04

The selection of the ten sectors to be monitored in 2003/04 was guided by the aim of producing results relevant to tracking the dynamics of the economy as a whole as well as with the intention of covering the most important features of e-business provision and adoption in Europe. There are, however, additional factors that have been taken into consideration for the selection process. An important aspect to be considered is that any sector which is not going to be covered during the 2003/04 period is a candidate for analysis in 2004 onwards, provided that the *e-Business W@tch* contract will be renewed.

Primary selection criteria

(a) The economic importance of the sectors for the EU economy: For the representation of e-business impacts in the economy as a whole, "large" sectors play a major role, since changes in their production models, their purchasing and marketing behaviour as well as their productivity and dynamics of growth have a very major effect on the performance of the entire economy. The assessment of the economic importance was mainly based on two standard economic indicators: the sector's share of employment and the amount of value-added by the sector.

(b) The relative importance of electronic business within the sector: As the *e-Business W@tch* has demonstrated in the first phase (2002/03), the intensity and nature of ICT and e-business usage differs considerably between sectors. Some sectors, although still small in absolute terms, are growing rapidly and/or illustrate the role which ICT and electronic business may play in other sectors in the future. The statistical proxy for the relative importance of e-business in a sector is the Pilot Index which was computed for 15 sectors (cf. European E-Business Report 2003), based on the eEurope 2005 E-Business Index.

Secondary selection criteria

In addition to these two fundamental criteria, some other selection criteria were applied in cases where the economic and e-business relevance appeared to be equal or similar. These criteria were:

- Balance of business activities: There should be a balanced mix of manufacturing and service sectors. Sectors could include a public service sector for comparison.

- The SME dimension continues to be very important. Sectors with a higher share of SMEs could therefore given priority over sectors where large companies dominate.

- Policy relevance: The selection needs to consider the policy relevance from the perspective of DG ENTR, that is for which sectors the DG has responsibility.

- Roll-out strategy: Some new sectors (not covered in 2002/03) should be included in order to broaden the monitoring scope of the *e-Business W@tch*. Among sectors with a comparable economic size, new sectors (not yet covered) may be given priority.

In order to come to an initial ranking of economic importance, the *e-Business W@tch* has computed a simple Index using two component indicators: the number of persons employed, and value added. The Index reflects the contribution of the sector to the total of all sectors compared.

The next step in the selection process was an attempt to make a joint consideration of the sector's contribution to employment and value added together with the relative importance of ICT and e-business in the sector. For this purpose, the *e-Business W@tch* has computed an Index that combines the two components. In such a ranking, Business Services comes out on top, followed by Health, Retail, the Financial Services sector and ICT Services.

Based on this statistical evidence and the considerations presented above, the *e-Business W@tch* proposed a role-out plan and a configuration of 10 sectors for the period 2003/04 that provide good coverage of relevant business activities, issues and countries, as well as being manageable in the organisation designed for the *e-Business W@tch* and the resources available.

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The ICT Services
The use of ICT and e-business in 2003/04 [1]

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This is the fourth *e-Business W@tch* report on the ICT services sector. The first two reports (published in July 2002 and January 2003) described the economic background of the sector in detail, and presented results from the June 2002 e-business enterprise survey. The third report (published July 2003) updated our findings with results from the second survey wave that was carried out in March 2003 in Germany, France, Italy, Spain, and the UK (EU5). The general economic trends and challenges that we described in the last report (*e-Business W@tch,* July 2003) are still valid today. We refer the reader to these earlier publications for an overview.

This new sector study updates and elaborates the previous analysis, for example by extending the geographical coverage to the Acceding Countries and further EU Member States. The first chapter of the report outlines the structure and the situation of the ICT services sector in the enlarged European Union. The main focus of the study, presented in chapters 2 and 3, is to analyse the role and implications of information and communication technologies and electronic business in the sector. This part is mainly based on results of the e-Business Survey 2003, including the second part of this survey carried out in November 2003.

1 Economic profile

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 with 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 borne in mind, though, that ICT services can also be defined in a broader way, e.g. by also including wholesale of office machinery[3].

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

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[1] This report was prepared before 1st May 2004. Hence, if not stated otherwise, the term "EU-15" refers to the 15 Member States until 30th April 2004, while the term "Acceding Countries" is used for the 10 new Member States which joined the European Union on 1st May 2004.

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

[3] This is done for example 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 earlier reports on this sector (www.ebusiness-watch.org).

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 should be competent in realising e-business projects.

Exhibit 1-1: Configuration of the ICT Services in terms of NACE Rev. 1

NACE Rev. 1 Division	Group	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

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-15, telecommunication services account for 54% of the production in the combined ICT services sector – just half of the value added and for about a third of the employees –, but for only 3% of the enterprises. This 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 firms, 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. Newcomers are also concentrated into larger groups.

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 a 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).

While software production used to be mainly a service activity, where software was produced according to individual specification for each buyer, the sector bears more resemblance with a product business today. 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 applications are 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 Exhibit 1-2[4]). They accounted for roughly 62% of total IT turnover in 2000 and were estimated to reach a share of 68% in 2003. Thus, IT software and services is a large market than hardware sales. Equipment sales, notably in the microcomputer segment, are on the rise again. In terms of value, however, the market remains relatively flat due to the drop in prices. In services, the growth was very low, in 2002 and 2003 after the Internet bubble burst. Despite an expected positive growth of the sector in the coming years, the days of double-digit growth rates in the EU have probably come to an end, at least for the next few years.[5]

Exhibit 1-2: Total IT markets in the EU-15 (annual sales in million Euro)

	2000	2001	2002	2003	2004
IT hardware (1)	**98,098**	**91,823**	**86,118**	**84,634**	**83,606**
Software products	**57,645**	**59,649**	**59,726**	**61,106**	**63,472**
System software	30,298	31,053	30,989	31,589	32,811
Application software	27,347	28,596	28,737	29,517	30,660
IT services	**104,729**	**113,505**	**114,906**	**118,080**	**123,644**
Consulting	10,327	11,336	11,262	11,354	11,845
Implementation	44,704	48,872	49,071	50,138	52,468
Operations management	20,789	22,452	23,428	24,802	26,518
Support services	28,909	30,845	31,146	31,786	32,814
Total	**260,472**	**264,977**	**260,750**	**263,820**	**273,423**

(1) Computer hardware + Office equipment

Source: EITO 2003

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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.

[5] OVUM Euroview, The EuroView ICT market outlook,2004, www.ovum.com

1.1.3   Industry structure by size

Telecommunication services and computer services differ in the way they produce services, as well as in the structure of their customer base. These differences also imply different e-business strategies and will consequently have an impact on what the key economic implications of electronic business will be for these sub-sectors of the ICT industry.

- Telecommunications services are largely infrastructure services, continuously provided to consumers and businesses. Requiring large inputs of capital and technology, these services are typically produced by large enterprises and sold to a large number of customers.

- Computer services, in comparison, can come in three variants:
    - Consulting services are typically project-based, which require mainly knowledgeable and skilled workers with only a limited use of capital and technology. They are produced mainly by small enterprises and often sold to a single customer.
    - Software (including software products, packages and applications) is often produced in the same way, especially when the software is customised to the needs of the buyers. However, standard software more and more closely resemble a product business when sold in the form of packaged to large amount of customers.
    - Finally, database services are very similar to telecommunication services in production, but can differ in customer numbers.

Exhibit 1-3 illustrates the significant differences between telecommunications (NACE 64.2) and computer services companies (NACE 72). While in telecommunications, about 90% of the employees work in large enterprises (with more than 250 employees), in computer services 70% of the employees work in SMEs. Regarding the average size of companies in both sectors, this also leads to huge gaps: while the average number of employees per company in telecommunications services is 82, it is only 6 in computer services. Even among the large companies, significant gaps can be observed: 4,307 employees per company on average in telecommunications and "only" 943 in computer services.

Exhibit 1-3: Size class distribution in ICT services

	Total (EU-14)*	Enterprises with … persons employed			
		1-9	10-49	50-249	250+
NACE	Number of enterprises	Structure in % of total			
64.2	12,929	84.1	10.6	3.5	1.7
72	348,326	93.0	5.7	1.1	0.2
	Number of persons employed	Structure in % of total			
64.2	1,061,125	2.6	3.1	5.1	89.3
72	2,180,610*	30.6	20.2	19.2	30.1

* Without EL (no data available)

Source: Eurostat New Cronos 2003, estimates and calculation by DIW Berlin (2003)

Exhibit 1-4: Main characteristics of each sub-sector

Sub-sector	Telecom Services	Computer services
Market	Large number of customers	Limited number of customers
Industry structure	Capital intensive	Labour intensive
Company size	Large	Small and medium
Service	Infrastructure based services	Project based services
Business model	Large economies of scale	Small economies of scale*

* Except standard software production.

Source : IDATE

1.2   Economic situation and key findings[6]

This section gives an overview of the size and structure of the ICT service industries, using key economic indicators from the New Cronos database of Eurostat. New Cronos is structured in nine parts ("themes"). Most of the data used in this chapter are derived from theme 4 "Industry, trade, and services", and here from the collection SBS (Structural Business Statistics). The chapter updates the respective section in the previous Sector Impact Studies on e-business in the telecommunications and computer related services by the *e-Business W@tch* from 2002/03.

Statistics presented in this chapter were prepared by DIW Berlin, which obtained the most recent data available from Eurostat in November 2003. Gaps in the official statistics resulting from missing data for individual countries or the respective year in the time-series of a country were computed based on economic calculations and estimates by DIW. The most recent official statistics available for industry-wide macro-economic indicators are from 2001. For the new EU Member States, the most recent national accounts usually date back to 2000.

The figures in the following exhibits of this chapter do not include the calculation of purchasing power parities between countries. Consequently, minor differences in terms of production value, value added, added value per person employed between countries are not necessarily significant and should be analysed cautiously.

1.2.1   Production, employment, and integration into world economy

Production

Exhibit 1-5: Production value and value added in European countries
for telecommunication services (NACE 64.2)

Country	Production value		Value added	
	Euro (million)	% of EU-15	Euro (million)	% of EU-15
BE	9 819.4	3.5	4 465.2	3.5
DK	5 492.1	2.0	2 320.4	1.8
DE	32 085.1	11.6	20 325.5	16.1
ES	21 322.1	7.7	10 857.4	8.6
FR	49 261.8	17.8	18 359.6	14.5
IT	44 027.4	15.9	18 847.0	14.9
LU	945.3	0.3	660.1	0.5
AT	4 585.3	1.7	2 728.6	2.2
PT	6 522.9	2.4	2 745.7	2.2
FI	5 763.1	2.1	2 050.0	1.6
SE	9 149.1	3.3	3 732.7	3.0
UK	71 327.7	25.8	31 134.9	24.6
Other: EL, IE, NL	16 344.7	5.9	8 245.8	6.5
EU-15	**276 646.0**	**100.0**	**126 472.9**	**100.0**
HU	1 992.3	0.8	1 316.6	1.1
MT	152.9	0.1	129.3	0.1
SI	623.0	0.3	145.2	0.1

Source: Eurostat New Cronos 2003, estimates and calculation by DIW Berlin (2003)
Regional distribution 2001 for EU-15, 2000 for Acceding Countries

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[6]   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.

In 2001, the EU-15 telecommunications companies had a production value of 277 billion Euro and created a value added of 127 billion Euro in telecommunications services (see Exhibit 1-5). In computer services, the figures were respectively 239 billion Euro for production and 129 billion Euro for value added (see Exhibit 1-6). The largest 4 member countries, namely Germany, the UK, Italy and France, are responsible for almost 73% of the combined value added (70% for telecommunications and 75% for computer).

These figures for value added make the sector relatively small in comparison with the remainder of the economy. 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 past strong growth.

Exhibit 1-6: Production value and value added in European countries
for computer related activities (NACE 72)

Country (1)	Production value		Value added	
	Euro (million)	% of EU-15	Euro (million)	% of EU-15
BE	7 066.5	3.0	2 953.3	2.3
DK	5 149.2	2.2	2 654.6	2.1
DE	39 098.9	16.4	22 958.2	17.8
ES	9 712.9	4.1	5 430.0	4.2
FR	36 704.0	15.4	18 573.8	14.4
IE	3 784.0	1.6	2 720.1	2.1
IT	30 782.2	12.9	14 147.5	10.9
LU	494.4	0.2	237.7	0.2
NL	14 168.1	5.9	7 725.0	6.0
AT	4 118.1	1.7	2 167.2	1.7
PT	1 186.3	0.5	599.5	0.5
FI	3 705.0	1.6	1 833.8	1.4
SE	13 613.4	5.7	6 026.2	4.7
UK	69 379.1	29.0	41 262.6	31.9
EU-15	**238 962.1**	**100.0**	**129 289.7**	**100.0**
CZ	1 213.5	0.6	500.5	0.4
EE	64.8	0.0	30.2	0.0
HU	576.3	0.3	317.6	0.3
LT	73.5	0.0	27.4	0.0
LV	93.6	0.0	43.1	0.0
MT	48.2	0.0	28.1	0.0
PL	1 752.9	0.8	1 051.6	0.9
SI	276.8	0.1	122.3	0.1
SK	264.1	0.1	110.4	0.1
Acc. C.	**4 363.7**	**2.1**	**2 231.2**	**1.9**

(1) Without EL.

Source: Eurostat New Cronos 2003, estimates and calculation by DIW Berlin (2003)
Regional distribution 2001 for EU-15, 2000 for Acceding Countries

Employment

The computer services sector employs more people in most member countries than the telecommunications services sector. As shown in exhibit 1-3, computer services employs 67% of all people in the ICT services sector in the EU-14 compared to only 33% in the telecommunication in 2003. However, the size of each of the two sectors measured by the number of employees differs considerably among member states and does not closely correspond to the countries' size (see

Exhibit 1-7 and 1-8). The computer services sector in the UK, for example, is as large as in Germany, despite the latter's value added being just half that in the UK. The same can be observed for telecommunications.

Integration into world economy

Within ICT services, 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 Telegeography (Global Traffic Statistics, published annually), the number of outgoing international calls from the EU-15 countries alone rose from 21.5 billion in 1995 to 43.6 billion in 2002, which means a 100%-increase within 7 years. All outgoing calls from one country to another country correspond to an export of telecommunication services from the point of view of the country called. The rise of outgoing international calls shows a genuine integration of telecommunication services into the world economy.

However, this phenomenon of integration is also observed in the development of offshore outsourcing in the computer related services sector. The development of geographically distributed production sites with specific competences (for example: software development, data processing centres) also contributes to the increase of data exchanges between countries. This trend contributes to a growing integration of this sector into the world economy.

1.2.2   Workforce and productivity

Workforce characteristics

Unit personnel costs in both sectors were relatively high in 2001 according to Eurostat (2003), which estimated the EU average at almost 48,617 Euro per employee for telecommunications and 50,124 Euro per employee for computer services as shown in Exhibit 1-7 and 1-8[7].

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 confirm 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 also differ between the two parts of ICT services. The sector is 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, where the figure for total services is 43%. It seems therefore that working in this field primarily attracts men.

By sub-sectors, telecommunication sector is much closer to the overall average, showing 38% percentage of female workers. ICT consulting sector, 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.

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[7]   Estimations did not include DK, DE, EL, ES, NL for computer services and DE, EL, ES, IE, LU, NL, UK for telecommunications.

Productivity

Productivity, measured as output per employee, differs significantly between telecommunications and computer services. The turnover, as well as the value added per person employed, are considerably smaller in the computer services sector. While in telecommunication services value added per employee in the EU-15 countries is at 119,188 Euro, the same value for computer services is only 59,291 Euro (see Exhibit 1-7). This outcome can be expected given the high capital intensity of telecommunications and the fact that these quantities only measure labour productivity and not total factor productivity. These differences are also reflected in investment data. Depending on country, aggregate investment in telecommunications is between 4 and 14 times higher than the computer services sector.

Exhibit 1-7: Employment, productivity and labour costs in the telecommunications (NACE 64.2) in European countries

Country	Employment Persons employed	Productivity[8] Value added per person employed	Labour Costs Per employee (1 000 Euro)
BE	34 298	130 191	73 038
DK	23 274	99 698	38 993*
DE	179 769	113 064	47 419
ES	84 748	128 113	44 100
FR	172 608	106 366	51 966
IT	111 791	168 591	42 496
LU	1 058	623 714	65 611
AT	23 302	117 097	48 736
PT	19 632	139 858	39 572
FI	20 951	97 847	42 499
SE	32 365	115 331	51 399
UK	258 190	120 589	54 503
Other: EL, IE, NL	99 138	83 175	35 978
EU-15	**1 061 125**	**119 188**	**48 617**
HU	20 926	62 917	13 914
MT	1 705	75 836	17 033
SI			21 905

Social security costs, which are part of total labour costs are by far the lowest in Denmark: about 5% of total labour costs compared with 12% in the UK, 17% in Germany and 30% in France.

Source: Eurostat New Cronos 2003, estimates and calculation by DIW Berlin (2003)
Regional distribution 2001 for EU-15, 2000 for Acceding Countries

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[8] This figures does not take into account price differences between the different countries

Exhibit 1-8: Employment, productivity, labour costs in the computer related activities (NACE 72) in European countries

Country	Employment Persons employed	Productivity Value added per person employed	Labour Costs per employee (1000 Euro)
BE	49 291	59 916	59 810
DK	47 741	55 605	55 883
DE	306 729	74 849	58 842
ES	145 058	37 433	31 953
FR	335 532	55 356	53 052
IE	20 393	133 381	41 978
IT	340 373	41 565	35 009
LU	4 501	52 806	52 199
NL	139 395	55 418	46 509
AT	38 759	55 915	48 683
PT	17 297	34 659	28 524
FI	37 505	48 895	46 561
SE	121 323	49 671	54 616
UK	576 733	71 545	55 164
EU-15 (without EL)	**2 180 610**	**59 291**	**50 124**
CZ	39 730	12 598	11 058
EE	2 374	12 721	9 176
HU	15 320	20 731	10 503
LT	3 497	7 835	5 525
LV	4 050	10 642	6 233
MT	1 194	23 534	13 326
PL	Na	Na	15 059
SI	Na	Na	20 080
SK	8 961	12 320	8 384
Acc. Countries [1]	**75 126**	**14 074**	**12 025**

[1] Persons employed and productivity: CZ, EE, HU, LT, LV, MT, SK only.

Source: Eurostat New Cronos 2003, estimates and calculation by DIW Berlin (2003)
Regional distribution 2001 for EU-15, 2000 for Acceding Countries

1.2.3 Growth dynamics in the last decade

Telecommunication and computer services both showed a picture of healthy growth in production and markets 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. This marks the beginning of the Internet and e-commerce bubble. According to EITO, ICT services markets in the EU-15 countries have recorded a Compound Annual Growth Rate (CAGR) of 11.7% over the 1998-2001 period (13.3% for IT services and 10.7% for carrier services).

From 2001 however, ICT services markets have been severely affected and growth has been reduced significantly. From EITO estimates, CAGR have reached only 3.4% over the 2001-2003 period (1.7% in IT services and 4.6% in carrier services).

This slowdown can also be seen in the trend of companies' sales (see Exhibit 1-9). The balance between increase and decrease has changed, especially in countries such as Germany or the UK in which a large share of companies within the ICT services sector have recorded a decrease in their turnover in the last period.

Exhibit 1-9 Share of enterprises with turnover increase/decrease in last fiscal year
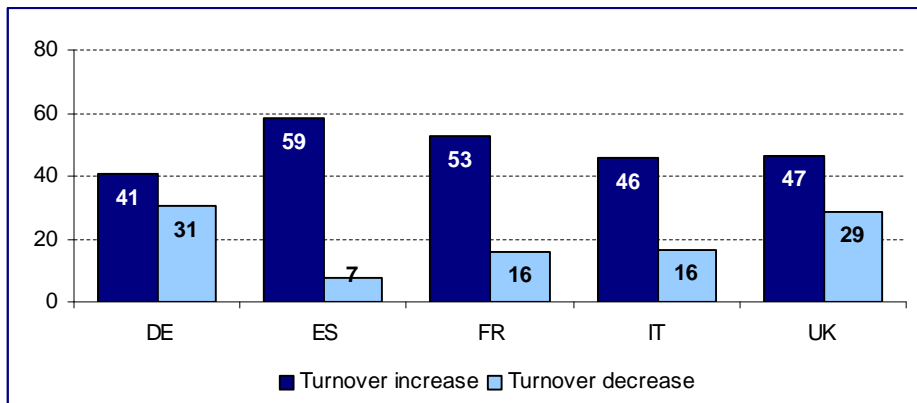
Source: *e-Business W@tch* (2003)

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 slightly increased afterwards. 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 for substituting labour through capital, the increase in demand for computer services and software during the last years also required an extension of the labour force. This increase has dwarfed the changes in telecommunication services employment and more than compensated for job losses in telecommunications (for instance, the number of employees in the IT sector has increased from 475,000 in 1991 to 595,000 in 2001 in Germany while it dropped only from 351,000 to 300,000 in the telecommunications sector over the same period).[9]

The European ICT market is now entering a phase of maturation. The double-digit growths observed in the late 1990s are gone with the crisis of the sector. The ICT sector is currently emerging from a period of stagnation. According to EITO[10], the European ICT market is forecast to grow by 3.1% in 2004 and 4.4% in 2005. This follows growth of just 0.8% in 2003 which was still higher than the US, which showed zero growth, and Japan where the ICT sector contracted by 0.8%.

The telecom services crisis

In 2002, the telecom services market experienced a weak growth that fell below 7%[11]. There are several reasons to explain these contrasting trends within the sub-sector:

- A contraction of the fixed telephony market in value for the first time
- A halt to the period of rapid expansion in mobile services
- Slower growth in the data sector but still high at around 9%
- Continued strong growth in the Internet sector, whose share of the total nevertheless remains too small to constitute any strong growth factor

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[9] Cf. EITO Yearbook 2004, labour market developments

[10] ibid.

[11] "European Telecom Service Market", IDATE, December 2003

A contraction of the fixed telephony market for the first time

The downward trend in the fixed telephony market segment became more pronounced in 2003, particularly as a result of fixed-mobile substitution and the introduction of carrier selection for local traffic in many countries. The fall is more marked in the markets of Western Europe alone which were down 2.4% in 2003, compared with 0.9% in 2002 according to IDATE. In fact, the increase in digital channels offset the fall by 3% of the number of analogue lines in 2002. The Acceding Countries experienced a growth of fixed telephony (3.4%), but fixed-mobile substitution was even more intense with mobiles having actually taken over from fixed services. Mobile networks in these countries are more highly developed, while the liberalisation of fixed services is still a recent happening.

A sustained growth but a slower pace in mobile services

The slowdown in the growth rate in the European mobile market segment is continuing, even though mobile services remain the main growth driver in telecom services. Mobile services are still enjoying sustained growth but at a much slower pace (close on 11% growth in 2002 and 8% in 2003, compared with 27% in 2001). The segment represents the main driver of growth in telecom services with additional net revenues from mobile telephony accounting for 75% of telecom growth in 2003. Their share of the overall telecom services market currently exceeds 45%.

With an average density of 80 subscribers per 100 inhabitants in Western Europe, the markets are approaching saturation point. There is greater room for an increase in the subscriber base in certain Acceding Countries, especially in Poland where the density in 2003 remains under 50%. However, as in the markets of Western Europe, medium-term growth in the Acceding Countries will lie in a rise in ARPU levels.

Mobile operators are currently seeking new vehicles for growth by launching new services such as Multimedia Messaging Services (MMS) and European versions of i-mode services as well as Mobile Office applications. Combined with an improvement in management performance, and assuming favourable legislation, these innovations should make it possible to stabilise ARPU levels and, in the best of cases, raise them slightly.

High rate of Internet and broadband adoption

The Internet and broadband segment is enjoying an extremely high rate of growth (30% in 2003), sustained by an increase in the number of subscribers (up 14% in 2003 and more than 20% the previous year). But it still accounts for no more than 7% of the total telecom services sector. It is the segment that displays the widest disparities between countries, with density rates in terms of subscribers per 100 inhabitants below 7% in most of the Acceding Countries and above 30% in the countries of Northern Europe.

Growth in the Internet sector is currently due to the escalation of broadband where the number of subscribers rose from 3% of the population to 5% between 2002 and 2003. The increase in broadband subscribers is being accompanied for the first time by a fall in the number of low-speed subscribers. This should lessen the impact of the increase in broadband subscribers on growth in the Internet sector in 2004.

In summary, the European telecom services market is growing at a slower rate compared with past years. The slowdown mainly stems from fixed telephony services in the Western European market as mobile services still continue to expand, though, at a slower pace. The main sources of growth in the sector come from the Acceding Countries. In 2002 and 2003, the Acceding Countries displayed the highest growth rates with around 15% of annual growth rate compared with an average of 4.9% for the 27 countries as a whole[12]. This rate of growth is largely due to the making up of lost ground in relation to other European countries. There has been a slowdown in the growth of fixed telephony but it remains positive, while mobile services are enjoying sustained high rates in excess of 20%.

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[12] European Telecom Services Market, IDATE, December 2003

Exhibit 1-10: Telecom market trends in Europe (2001 – 2007) in billion euros

	2001	**2002**	**2003(e)**	**2004(f)**	**2007(f)**
Germany	47	50	52	54	59
United Kingdom	44	45	46	48	52
France	29	30	32	34	39
Italy	32	34	35	35	39
Spain	19	21	22	23	26
Western Europe (17 countries)	**228**	**242**	**252**	**260**	**288**
Growth rate	*13.1%*	*6.0%*	*4.2%*	*3.3%*	*3.6%*
Acceding Countries (10)	**16**	**18**	**21**	**23**	**27**
Growth rate	*na*	*16.1%*	*14.3%*	*9.1%*	*6.3%*
Total Europe (27 countries)	**244**	**260**	**273**	**283**	**315**
Growth rate	*na*	*6.6%*	*4.9%*	*3.7%*	*3.8%*

(e) estimate – (f) forecast

Source: IDATE

Impact of regulatory decisions in the telecom services sector

The evolution of the regulatory framework has had a considerable impact on the telecom services sector. The European Commission has played a crucial role in establishing a regulatory environment that contributed to the development of a very competitive telecom services market. The transposition of the directives contained in the new "telecom package" into national law, should end up on a new regulatory framework.

The most significant measure has been the start of the market analysis process undertaken by the various national authorities within the framework of new rules for defining relevant markets. The examination carried out by the authorities is based on the European Commission's recommendation of February 2003 that identifies 7 markets at retail level and 11 markets at wholesale level. The relevant markets identified by the Commission are defined far more precisely than in the former regulation (based on three retail markets – fixed mobile and leased line – and the interconnection market).

The use of these newly defined markets should enable the authorities to identify Significant Market Power (SMP) operators with greater precision and thus impose the required degree of ex ante regulation. On the contrary, it could in some markets lead to the virtually automatic designation of all players as SMP operators. This is currently an extensively debated question in the market for call termination on mobile networks. Also evident in the multiplication of relevant markets and the degree of ex ante regulation is a move away from general competition law, contrary to the objectives of the "telecom package".

The initial steps towards the application of the new regulatory framework during 2004 will shed light on the various options chosen by the regulators, exactly how much room they have to manoeuvre and the possible emergence of a new balance between European harmonisation and the independence of national regulators.

With regard to the various items on the agenda, a certain amount of progress has been made towards the development of competition:

- Interconnection charges continued to decrease in 2003, although at a slower pace than in 2002. According to the European Commission, the average basic prices at local level in the European Union as a whole fell 5% in 2003 as against 9% in 2002, settling at 0.63 Eurocents in August 2003. Overall, prices have fallen 44% over three years at local level, 32% for simple transit and 21% for double transit. But variations among countries remain wide with simple transit charges ranging from 0.66 Eurocent in the United Kingdom to 1.30 in Austria and 1.43 in Finland. In the 10 Acceding Countries, interconnection charges are still high in comparison with the European

average (0.97 Eurocent in 2003). Interconnection charges for simple transit range from 1.23 Eurocent in Poland to 2.23 Eurocent in Hungary but the regulatory measures are gradually being implemented[13].

- Call termination charges on mobile networks are attracting increasing attention on the part of regulators, several of whom have intervened to have the charges reduced by obliging operators with significant market power (SMP) to apply cost-oriented charges. Since 2002, in several countries, the authorities have intervened by making it compulsory for SMP operators to apply cost-oriented interconnection charges. This has brought about sharply contrasted changes in interconnection charges featuring a significant reduction in countries where the regulator has taken action (down an average of 15% over the year) as opposed to unchanged charges elsewhere. According to calculations made by the European Commission, the charges fell on average from 18.92 Eurocent in 2002 to 17.45 Eurocent in 2003, i.e. an 8% reduction over the year. With the exception of France and Portugal and one operator in Spain and two in Greece, the charges are the same, regardless of call origin (fixed or mobile network). The biggest reductions were recorded in Greece (19%), France (18%), Spain (16%), Italy (13%), Portugal (8%), Belgium (7%) and Ireland (7%), all being countries with charges exceeding the European average. The gaps between countries have thus been narrowed even though they remain wide, ranging from just under 13 Eurocent in Austria and Finland to over 19 Eurocent in Greece, the United Kingdom and the Netherlands. Portugal stands out with an even larger difference at close on 27 Eurocent.

- Carrier pre-selection is thus playing a vital role in the development of competition in Europe, while the progress being made by alternative operators in the area of direct access (including unbundling) remains very limited. In relation to the comparative size of the market, the use of pre-selection is greatest in the countries of Northern Europe (Norway, Sweden, Denmark and the Netherlands) where the number of lines on pre-selection lies at 30% or more of the total number of lines. On the other hand, the number of subscribers using the services of an alternative operator via direct access is below 6% on average in the European Union[14]. Progress in the direct access field (including unbundled access) by alternative operators has been most marked in the United Kingdom and Denmark and, to a lesser extent, in Spain, with a market share of around 10%. In France, on the contrary, the use of direct access is extremely limited.

- Having become obligatory in all EU countries in July 2003, mobile number portability has had only a limited impact on operators' market shares, due in part to the technical problems of implementation, but it could play a more important role in pace with simplification of the procedures by the authorities.

- Unbundling problems have led a great many ISPs to opt for incumbent operators' wholesale offers. In several countries, the regulatory authorities have taken action against the pricing practices of incumbent operators, particularly in regard to the differences between their retail and wholesale prices. Significant progress has nevertheless been achieved in unbundling since the early part of 2003, although varying widely from one country to another. This has resulted in a fall in prices and an increase in the number of unbundled lines, which reached 1.8 million in mid-2003, compared with 600 000 at year-end 2001 and just over a million in 2002. This progress chiefly concerns partial unbundling.

Regulatory framework in the Acceding Countries

The Acceding Countries have also made significant progress in liberalising their national telecom market. Heavily influenced by the EU accession process and the WTO agreement of 1997 on basic telecommunications, the telecommunications sector underwent major structural reforms as in other sectors of the economy. The Acceding Countries undertook to bring their legislation into line with EU

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[13]   Source : IDATE from European Commission and IBM 3ie Report on Monitoring of EU Candidate Countries

[14]   Source: European Commission

rules. The markets have gradually been opened up to competition with total liberalisation of the last of the countries in January 2003. Incumbent operators have been privatised, at least partly, while independent regulatory authorities have been set up in all countries.

Ensuring harmonisation with European rules was made even more difficult as a result of the recasting of the European regulatory framework and the related adoption of new directives in 2002. The new future Member States were required to implement the new regulatory framework by July 2003, in line with the EU countries, although the European Commission has provided for a period of technical transition to facilitate the changeover from the old to the new system.

Incumbent operators in all countries have undergone restructuring, firstly involving separation of the ministerial authorities and setting up as a business firm**,** followed by privatisation, generally inviting the participation of a strategic foreign investor. In four other countries (Slovenia, the Czech Republic, Malta and Latvia), the State still owns over 50% of the capital of the incumbent operator.

Privatisation of the incumbent operator has resulted in the arrival of a foreign strategic investor, usually a West European incumbent. For example, Deutsche Telekom controls the Hungarian and Slovakian incumbent operators. Deutsche Telekom was also due to take control of the Czech operator in partnership with Danish operator TDC but there has been no privatisation agreement concluded. France Télécom is present in Poland through TPSA. Telia and Sonera had both gone into the Baltic countries (Estonia, Latvia and Lithuania), thus endowing the new group, TeliaSonera, with a strong presence in this region, while KPN, in turn, is present in the Czech Republic.

In the search for an investor and a better offer, privatisation projects have in some cases run counter to liberalisation objectives. This is because it has been possible for governments to enhance the attractiveness of the incumbent operator by delaying the introduction of competition in certain segments of the market. The more recent privatisation projects have encountered difficulties arising mainly from poor market conditions and the problems being experienced by potential investors themselves, but also from internal disagreement. In the Czech Republic, the State's sale of its 51% stake to the Deutsche Telekom-TDC consortium, concluded in 2002, finally ran aground the following year because the two partners failed to reach agreement.

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. This also means that they have been particularly affected by the emergence as well as the burst of the Internet bubble. Apart from this major impact there are also a variety of technical and legal factors that generated trends and posed challenges to ICT services. These differ between telecommunication services companies and the computer services industry.

1.3.1 Market competition and general trends

Telecom Services

The European telecom services industry enjoys a forerunner position in the global telecom services competition with 25% of share of the global market in 2002. Among the 10 largest telecom services operators in the world in 2002, six are European companies as shown in Exhibit 1-11.

Exhibit 1-11: Ranking of the 10 world leaders by telecom revenues in 2002

Rank 2002	Operator	Country	Revenues 2002 (USD million)
1	NTT	Japan	87,114
2	Verizon	USA	67,625
3	Deutsche Telekom	Germany	50,528
4	Vodafone	United Kingdom	45,601
5	France Telecom	France	43,855
6	SBC	USA	43,138
7	AT&T	USA	37,827
8	Telecom Italia	Italy	28,610
9	British Telecom	United Kingdom	28,114
10	Telefónica	Spain	26,739

The 2002 ranking does not include MCI WorldCom (N°7 in 2001) which announces revenues of 13.8 billion USD for the second half of 2002. The figures for BT are dated March 2003 (April 2002 to March 2003). USD = 1.063 EUR

Source: IDATE from operators

However, the arrival of numerous operators in the first years following liberalisation and a period of restructuring and consolidation that accelerated with the collapse of the telecoms bubble have contributed to fiercer competition in the market.

- In the fixed telephony market, initially felt in the long-distance sector and more so in the case of international traffic, competition has now spread to the local sector. Incumbent operators in West European countries have maintained average market shares of above 60% in the international sector, close on 70% of long-distance traffic and 80% in the local sector. The fall in the prices of long-distance and international calls has now become less pronounced. In the international sector, for example, which is the most highly competitive sector, the reduction in prices has fallen from an estimated annual average of 9-10% between 1998 and 2001 to 4-5% since 2002.

- In the mobile services sector, incumbent operators enjoy market shares of around 60% in countries where there is only one alternative operator, between 40% and 50% in countries with three operators and just under 40% in countries with four or more operators, but only 24% in the United Kingdom. Overall, after a comparatively agitated period in which the arrival of a third or even fourth operator automatically brought about a contraction in the relative shares of the established operators, their positions seem to have changed at a slower pace, if not simply remaining static. 3G prospects do not point to any radical changes in the structure of the mobile market.

- In the Internet sector, the restructuring carried out since the bursting of the financial bubble in 2000 led to consolidation in the countries of Europe. Incumbent operators hold strong positions in these markets, with a share of the dial-up access market exceeding one-third in France, Spain, Italy and Germany. In the broadband sector, competition is to be found chiefly between cable modem and ADSL, but recent progress has gone much more in favour of ADSL technologies. In the DSL market, the spread of wholesale offers and unbundling have led to a fall in the share accounted for by subscriptions sold by incumbent operators or their ISP subsidiaries. Nevertheless, these operators enjoy the lead in Germany, Spain and France and by providing telephone lines or DSL infrastructure, they continue to control a major share of value in these markets when they do not sell subscriptions.

With market shares varying between 50% and 85% in the different end-user sectors, incumbent operators are confronted with competition from a small number of players (wholesale operators, mobile operators, Mobile Virtual Network Operators (MVNO)) enjoying far stronger positions than the alternative operators who have proliferated in recent years (see Exhibit 1-12). The competition could also be fiercer as new IP voice services will develop in the coming years favouring the emergence of new players for the Internet world in particular.

Exhibit 1-12: The value chain in the telecom service sector
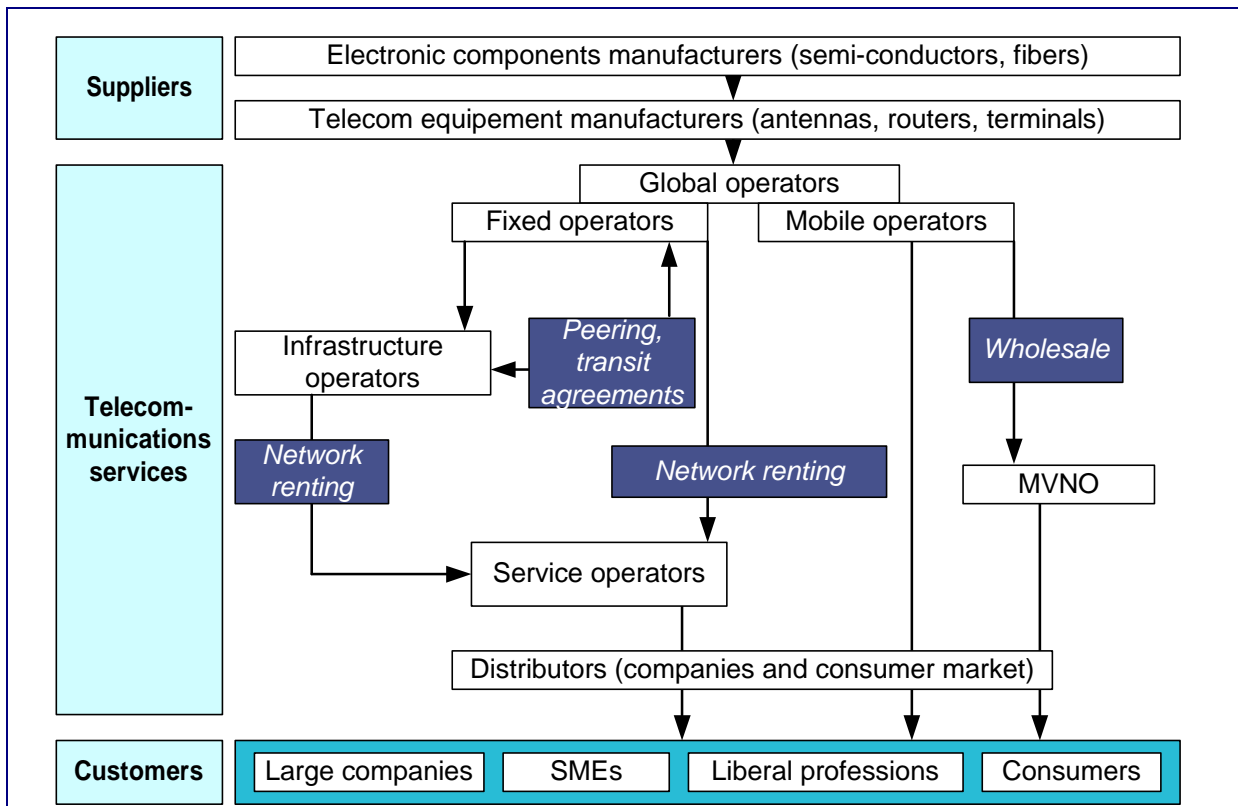
Source : IDATE from Eurostat, "Le secteur français des télécommunications".
(The French telecommunications sector). September 2003

As a consequence, telecom operators are increasingly seeking to build partnerships and develop new types of global services. For example, in 2004, British Telecom (BT) and Hewlett Packard built up a new partnership. BT will provide telecom network management to Hewlett Packard, which in return, will manage BT's servers and PC workstations. The final goal will be to propose a global service to other European companies and the UK SMEs.

Computer related services

The computer services sector has also experienced one of its toughest times through layoffs, price pressure, commoditization, low demand and budget cuts from 2001. Things are rapidly changing in the computer services sector as suppliers and end-users have dramatically evolved after enduring and surviving an extraordinary cycle of strong growth followed by a rapid deterioration. All these changes have significantly modified the working environment and while the use of technologies has broadened, its value chain has shifted:

- Upstream added value chain: computer services not really strategic suppliers, as most software editors develop their products from their own skills. However, integrators or new players offering global offers are more and more inclined to build up partnerships with telecom network manufacturers, network software developers and also other software editors and computer manufacturers. For example, Dell announced in 2004 an agreement with SAP to manage common installed servers base. Dell will provide maintenance services to 5,000 users of SAP applications functioning on Dell servers. It will also provide services to SAP's customers to help them migrate their SAP applications servers from Unix to Linux systems. Via this agreement, the customers' maintenance cost of SAP applications should be reduced by 25%.

- Downstream added value chain: the distribution of software and computer services sell through two channels: direct sales (market prospecting, on-line sales, call for tender), and indirect sales (resellers, retailers, e-distribution, value added retailers (VARs). Integrators use direct sales but

essentially companies and public administrations target. Software editors use various channels of indirect sales to address the consumer market and SMEs market.

The border between computer related service sector and other sectors is getting more and more blurred (see Exhibit 1-13). Computer services providers (leaders and challengers) have found new ways to respond through alliances, acquisitions, disposals, new concepts in order to re-deploy their positioning and offerings. The most recent phenomenon in the ERP market is the vendors' move towards providing integration software and more cost effective maintenance/upgrade software. For example, SAP, PeopleSoft, Oracle were able to capitalise by offering comparable applications that were more easily integrated into existing customers' back-office.

This illustrates a fundamental change from simply installing enterprise software into a company and hoping that it delivers value, to the solution approach where computer services companies work more closely with application vendors by analysing a customer's process and by building a solution to increase a company's efficiency utilizing software technology.

But it is true that large vendors, especially ERP vendors have had many advantages over smaller vendors during the downturn because they have larger installed bases and larger services organisations, which have both been leveraged to stabilise their revenues in a context of weak software licence sales. These installed bases include long time customers where the ERP vendor understands its customers business (processes, budget, organisation culture) as well as technology (infrastructure, existing systems, functionality gaps), making it very hard for other niche vendors to penetrate the e-business solutions market.

Exhibit 1-13: The value chain in the computer related activities sector
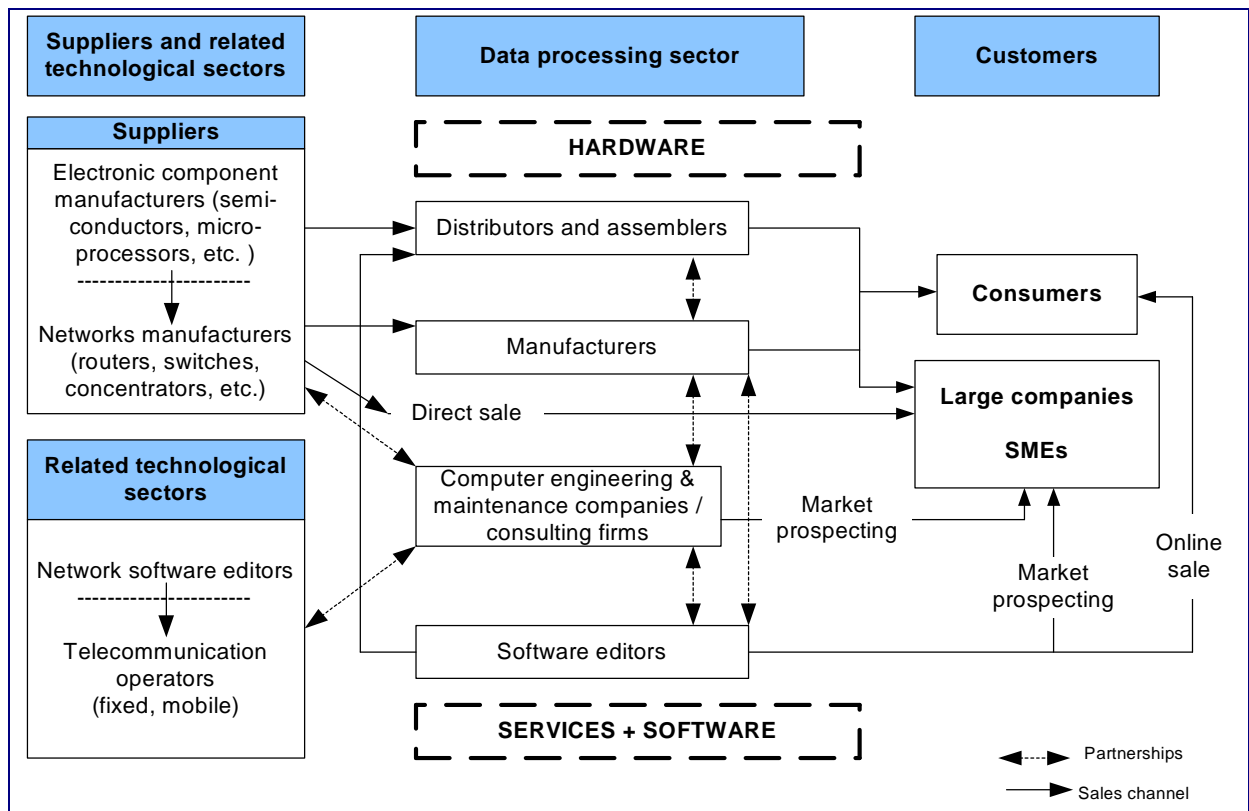
Source : IDATE from Eurostat, "Le secteur français des logiciels et services informatiques ".
(The French soft wares and data processing services sector). September 2003

European market

In Europe, SAP remains the only one world beating application software product provider. This was possible because the company has a strong home market for that product. That is the reason why the US wins hands down every time for infrastructure software products. But Germany has had the strongest manufacturing sector in Europe for many decades. That creates the right environment for SAP and the thousands of SAP related support companies to thrive. France has always had a strong bespoke development market. The country has created several "world-sized project services" companies – like Cap Gemini/Ernst & Young or Atos Origin (see Exhibit 1-14).

The acquisition of the large majority of Schlumberger Sema's worldwide activities by Atos Origin in September 2003 represented the largest operation to take place in Europe in the IT services market since the Cap Gemini/Ernst & Young merger and the acquisition of debis Systemhaus by Deutsche Telekom. This acquisition operation is characteristic of the race to become bigger and bigger in a still very scattered industry. The race to become "global" in size takes place imperatively at the local level. It is in fact essential to have a strong presence (in the Top 10 at least) in each European country in order to claim to be competitive in the development of systems integration and outsourcing projects launched by worldwide customers. The market will concentrate as the computer sector service is also maturing.

Exhibit 1-14: Ranking of the 10-world computer services leaders by revenues in 2002

Rank 2002	Enterprise	Country	Software & service revenues (USD million)
1	IBM Global Services	USA	36,360
2	Microsoft(1)	USA	28,365
3	EDS	USA	21,502
4	Nec Solutions	Japan	15,911
5	Futjisu (2)	Japan	15,477
6	Computer Sciences Corp.	USA	11,346
7	Oracle (3)	USA	9,673
8	Hewlett-Packard (4)	USA	9,095
9	SAP	Germany	7,009
10	Cap Gemini Ernst & Young (5)	France	6,663

(1)   Closed exercise in 06/31/02, (2) Closed exercise in 03/31/02 (3) Closed exercise in 05/31/02 (4) Closed exercise in 06/31/02 (5) Closed exercise in 10/31/02. In 2002, HP acquired Compaq

Source : Annual reports

1.3.2   Business issues

Telecommunication services

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

- New technologies for network access as well as network administration;

- 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 and in the broadband areas;
- Growth of data traffic on telecommunication networks and
- Cuts in investment and the search for a reduction of operational costs in order to face financial crisis.

Technology

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 Integrated Digital Service Network (ISDN) or analogue modem. Digital Subscriber Lines (DSL) as well as cable modems offer the potential for new bandwidth-intensive services such as streaming video, TV on Internet. Since the start of 2001, the number of broadband subscribers in Europe has grown substantially, and this despite difficult times for the telecommunications and Internet sectors. The total number of broadband access connections in the EU-15 reached 22.5 million at the end of 2003, according to ECTA (European Competitive Telecommunications Association), a 70%-increase in one year. Broadband's maturity is characterised by simpler access to broadband technologies for web users. The competitive spirit led to the multiplication of offers, both access and content. Broadband's players have segmented their offers in such a way as to respond more and more specifically to the various target customer segments. Rates are dropping, making broadband increasingly affordable. Parallel to this, companies are increasingly aware of the benefits of broadband for their online business, and adapting their strategies by forging partnerships with broadband 's leading operators.

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". In the 1990s operators digitised their networks 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.

Regulatory framework

Another major issue was the evolution of the regulatory framework. 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, for the incumbents' telephone services as well. However, the new competitors have been only partially successful, due to weaker than expected demand and 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.

After opening progressively the European telecommunications markets, ending with the Full Competition Directive (published in 1996 and becoming effective in most Member States in 1998), the European Commission has promoted in 2002 a new regulatory framework to simplify and position regulation of communications in line with general law competition law principles.

Mobile standardisation

A further major issue has been, and still is, cellular digital telephony. With the acceptance of the Global System for Mobile Communications (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 and as prices for mobile phone calls have fallen. 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 (Universal Mobile

Telecommunications System (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.

However, the migration of 2G application platforms (Short Messaging System (SMS) and Wireless Application Protocol (WAP) portals) to General Packet Radio Services (GPRS)-based platforms has taken hold with a marked acceleration in late 2002-early 2003 thanks to the availability of Multimedia Messaging system (MMS) and kiosk-style portals geared to the consumer market. Data services accounted for about 15% of mobile operators' service revenues in 2003.

Market development

A fourth 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.

At the end of the 1990s, the communications industry was one of the economy's most buoyant sectors, with stock values reaching record heights. With considerable cash available and unrelenting increases in share prices, telecom operators spent heavily on product development, networks, and acquisitions. The hunt for international expansion intensified towards the end of the decade, at increasingly higher prices. At the same time, European operators spent over 100 billion Euro on UMTS licences alone, not including the costs of deploying networks and new services.

With the slowdown in market growth adding to their financial difficulties, operators were forced to review growth strategies and take a series of drastic measures to cut costs and restore market confidence. These measures included:

*   A cut in investment: since reducing capital expenditure has an immediate effect on the bottom line, nearly all operators reduced their capital expenditure between 2001 and 2002. The decision resulted in the postponement, and in some cases cancellation, of plans to deploy new mobile networks.

*   A reduction in operational costs: operators set up cost reduction programmes, such as steps to reduce personnel costs and froze recruitment, or immediate tracking of costs such as travel expenses and rationalisation of procurement and support activities. This leads the operators to search for new solutions improving efficiency, and online applications can significantly help to support this process.

Measures taken by operators in the aftermath of the market crash started to bear fruit in 2002. These positive developments continued in 2003: despite stagnating revenues, operating income has been well on the increase, resulting in improved operational profitability.

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.

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

Technology

Many of the issues faced by the software industry are directly related to the Internet and the possibilities it enabled. An important 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.

Secondly, new technologies for knowledge management and coordination increasingly required to manage the growing complexity of ICT projects and to be able to co-operate with internal staff as well as remote external partners. Technological support for managing such large and diverse groups of IT workers becomes necessary. This is one of the main challenges of the ICT services sector.

Legal environment

The software industry has intensively discussed two related legal questions. The first is the question of intellectual property rights protection, as international exchanges of software over 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 protected by copyright, ICT industry now appears to be strongly against patenting software as this might arguably stifle innovation in the software development industry.

Market development

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

During this time span, the outsourcing services industry (part of NACE 72.3, data processing) has also seen an increasing demand. Firstly, new strategies focused on core competencies and cost reduction policies led many companies to outsource parts of their IT infrastructure that they considered were not of strategic importance. And secondly, the Internet reduced communication costs and enabled the implementation of more flexible organisations.

The Internet also 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.

2   The use of ICT and e-business in 2003/04

2.1   Introduction

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 993 companies from 12 European countries. The analysis focuses, firstly, on the specifics of the ICT services sector compared to the 9-sector average in the EU-5, and secondly, on differences between smaller and larger companies within the sector, as well as differences between countries. 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.

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.

2.2   E-business indicators – the statistical picture

Information presented in this section is predominantly based on the e-Business Surveys of the *e-Business W@tch*. The first survey was conducted in April 2002 and covered more than 9,000 enterprises from 15 sectors and all EU Member States. The 2003 survey was conducted in two waves: In March 2003, about 3,500 enterprises from seven sectors and five countries (France, Germany, Italy, Spain and the UK) were interviewed about their use of ICT and e-business. The second wave of interviews (about 7,000) was conducted in October and November 2003. Six other countries, including new Acceding Countries were interviewed: Ireland, the Netherlands, Finland, the Czech Republic, Estonia, Poland, Slovenia.

In the second wave, some new indicators were introduced. Thus, although the main parts of the questionnaires used in the two waves were the same, not all information is available for all sectors or countries, depending on whether the survey of this particular sector in a country took place in the spring or autumn wave of the 2003 survey. The footnote of the exhibits show the time, base, number of observations and weighting schemes for data reported.

More information about the methodology of the survey (definitions, sampling, weighting principles) and about the coverage of sectors and countries is available in the Annex to this report and on the website of the *e-Business W@tch* at www.ebusiness-watch.org.

A number of methodological limitations should be borne in mind:

- While survey results allow an analysis of differences between company size-classes, 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 two sub-sectors, even though one can consider that Small and Medium Enterprises (SMEs) are representative of computing sub-sector, as large companies are representatives of telecom sub-sector.

- Some differences in statistical data may appear as significant when presented in breakdowns per country and/or size classes but that may only due to the small size of the statistical samples. These data should therefore be cautiously analysed, especially data about the new EU Member States.

From a statistical viewpoint, there are also very important differences between the two sub-sectors: telecommunications services and computer services:

- Complete data sets are only available for EU-5 (Germany, France, Italy, the UK, Spain), so comparisons with cross-sector averages are therefore based on EU-5 data. To give an indication about regional differences, a number of cross-country comparisons are provided. When comparing different countries, 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. For example, the computer services sector in the UK, is considerably larger than in Germany, despite the latter's larger economy. The same can be observed for telecommunications.

- Data are available in employment-weighted and enterprise-weighted form. While enterprise-weighted data are based on the number of enterprise, they are often close to the SMEs results, and do not take into account the number of employees; employment weighted data are more biased towards large firms, but are very useful when employee-oriented indicators are analysed (such as the computer usage or Internet access).

- Lastly, the spreading of the total number of employees in the ICT services sector do not largely differ by enterprise size-class but differs greatly by sub-sector. As shown by Exhibit 1-3, in the ICT services sector, both SMEs (< 250 employees) and large enterprises employ each 50% of the total number of employees. But among the 1.6 million of employees working in SMEs of the ICT services sector, 1.5 million (93%) belong to the computer services sector. Consequently, the employment in SMEs concerns essentially the computer services sector.

2.2.1   Infrastructure and skills development

This part analyses the level of ICT equipment and the usage of e-business in terms of connectivity of enterprise (bandwidth Internet access, remote and wireless access and data exchanges between ICT services companies). A specific part addresses the issue of skills development in the sector.

IT and network infrastructure in companies

The survey results confirm expectations that ICT services companies are fundamentally better equipped with IT infrastructure than the 9 sector average in the EU-5. This observation further validates the previous results from the e-Business Survey 2003.[15] The ICT services sector is an early adopter of information technologies.

On the European E-Business Scoreboard, which benchmarks 10 sectors of the European economy in four dimensions, the ICT services sector has an indexed score of 1.5 in the dimension of "connectivity of the enterprise". An index of 0 represents the sector average, with +/-1 being the standard deviation from the average. ICT services sector is ranking on the first position.

As shown in Exhibit 2-1, almost every employee works in a company that uses computers, and a large majority has access to a Local Access Network (LAN). Rather than the mere use of computers, the existence of a LAN is a good indicator whether companies possess the minimum network architecture for automating internal business processes electronically. A LAN is the most common way of connecting computers for sharing files, communications facilities and software applications within a small area, typically inside a building company or organisations.

The exhibit also indicates that there are no significant differences between SMEs (except, possibly, for micro enterprises with less than 10 employees) and large companies in terms of use of physical network infrastructure in the ICT services sector. Large companies have set appropriate networks to allow information exchanges between employees, while this is often accomplished in a more informal way in SMEs.

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[15]   cf. www.ebusiness-watch.org (publications –2002/03)

There is a considerable gap between the ICT services sector and the rest of the sectors covered by *e-Business W@tch,* particularly for enhanced technologies such as WAN or remote access. The diffusion rate tends to be twice as high in the ICT services as in other sectors.

Exhibit 2-1: Use of physical network infrastructure in the ICT Services (2003)

	Use computers	Local Area Network	Wide Area Network	Remote Access
Sector total (EU-5)				
% of employment	99	87	59	73
% of enterprises	99	72	15	53
0-9 employees	99	71	13	52
10-49 employees	97	87	45	78
50-249 employees	100	93	58	78
250+ employees	100	93	85	79
All (9) Sectors (EU-5)				
% of employment	96	61	29	37
% of enterprises	89	32	5	16
DE Germany	100	94	74	84
ES Spain	100	85	49	69
FR France	100	91	60	46
IE Ireland	100	94	60	79
IT Italy	100	88	43	74
NL Netherlands	100	97	71	92
FI Finland	100	91	67	95
UK United Kingdom	98	81	60	84
CZ Czech Republic	100	86	47	76
EE Estonia	100	99	79	85
PL Poland	96	75	38	50
SI Slovenia	100	98	74	89

Base: all enterprises. EU-5 = DE, ES, FR, IT, UK. N=502 for EU-5 sector total and 50-100 per country.

Weighting: Figures for size-bands in % of enterprises. Figures for countries are weighted by employment ("enterprises comprising …% of employees"). Reporting period: March/November 2003.

Source: *e-Business W@tch* (2003/04)

From a country perspective, firms in Southern European countries such as Spain and Italy are lagging behind compared to companies in Finland, the Netherlands and Germany in terms of use of LAN, WAN and remote access. As regards WLAN, (the question was not included in the first part of the 2003 survey), the ICT services sector seems particularly well equipped, especially in companies located in Estonia where it reaches 72% of employees.

The second observation is the relatively good ranking of firms in some of the Eastern European countries, such as Estonia and Slovenia, in terms of network infrastructure. They even outperform companies from some of the larger EU-15 Member States. In fact, Estonia's economy is known to be very well linked to the Finnish ICT services sector. Estonia leveraged its location in the Nordic region (gateway between the East and West) and its historically close ties to its Nordic neighbours, who are the world's leaders in the use and manufacturing of new information technology products. This enabled the country to integrate itself into the supply chains of its Scandinavian counterparts as an initial step to gaining access to the international market.

However, other companies in countries such as Poland, and to a lesser extent in the Czech Republic are not as advanced. There is a considerable digital divide, even within this sector which takes a pioneering role in the information society.

Exhibit 2-2: Enterprises enabling remote access to their computer system (2003)

Legend: ■ Sector total (EU-5) □ 0-9 employees ■ 10-49 employees ■ 50-249 employees □ 250+ employees

■ Remote access

□ Wireless LAN

Base: all enterprises. EU-5 = DE, ES, FR, IT, UK. N=502 for EU-5 sector total.
Weighting: Figures for size-bands in % of enterprises. Figure for "Sector total" and by country is weighted by employment
("enterprises comprising …% of employees"). Reporting period: March/November 2003.

Source: *e-Business W@tch* (2003/04)
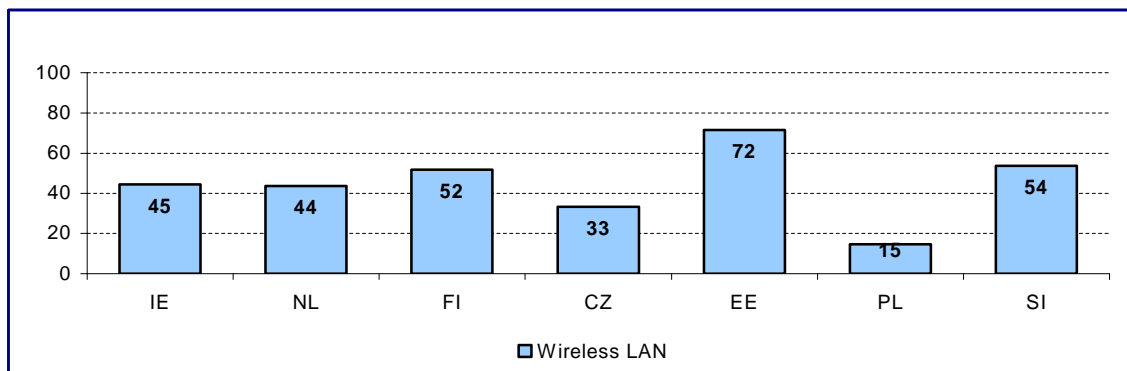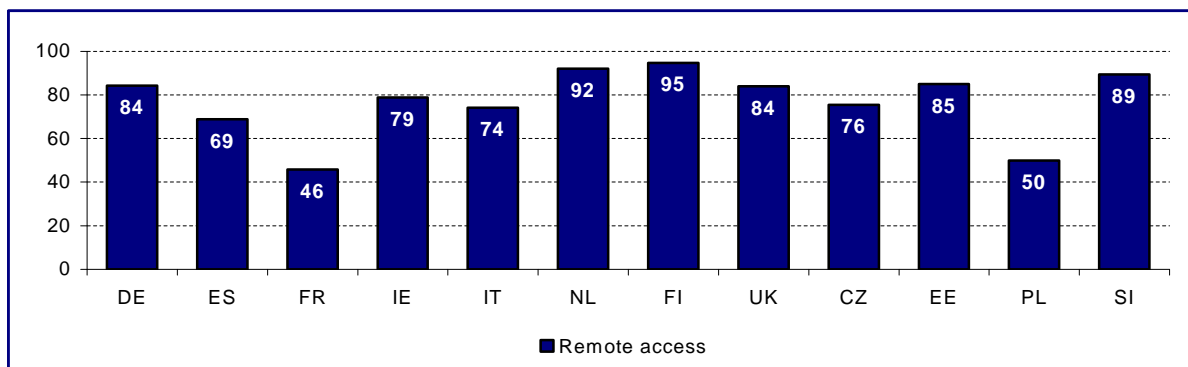
Internet access and use of basic Internet applications

Again, the ICT services sector is clearly above the all sectors average regarding Internet access. Almost every employee has access to the Internet, uses e-mail and the World Wide Web. The size of the company is no longer a key factor of differentiation. No great differences exist between large and small companies regarding Internet access.

In fact, Internet access constitutes a key element to stay competitive in the ICT services market. For example in the telecom sector, the Internet has revolutionized the way in which telecom services operators provide billing services to their customers. According to a study of Killen & Associates[16], by 2005, telecom operators will save 20 billion euro on billing and customer care costs by moving

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[16] Killen & Associates," Enterprise e-billing and Payments Market : "New opportunities for billers,"2001

customers from paper bills to the Internet. The emerging area of IP-operated services has seen the development of a single bill for different delivering services such as fixed and mobile phone communications, Internet access or even kiosk services.

In the computer services sub-sector, which is mainly represented by SMEs, wide access of employees to the Internet is critical to facilitate easy access to code sources, to foster innovation in software development, to download bug fixing scripts or new software releases.

Generally speaking, companies in the ICT services sector authorise full access to Internet applications such as e-mail and WWW, which contributes to the increase of usages compared to other economic sectors. The diffusion of basic Internet access and standard Internet applications such as e-mail and WWW usage have almost reached saturation levels in the ICT services sector throughout Europe.

Exhibit 2-3: Internet access and use of basic Internet applications (2003)

	Have access to the Internet	Use e-mail	Use the WWW
Sector total (EU-5)			
% of employment	98	98	94
% of enterprises	97	97	90
0-9 employees	97	97	90
10-49 employees	96	96	94
50-249 employees	99	99	95
250+ employees	98	98	96
All (9) Sectors (EU-5)			
% of employment	88	84	77
% of enterprises	76	68	58
DE Germany	100	100	100
ES Spain	99	99	79
FR France	94	94	93
IE Ireland	100	100	100
IT Italy	99	99	91
NL Netherlands	100	100	99
FI Finland	100	99	100
UK United Kingdom	98	98	97
CZ Czech Republic	100	100	98
EE Estonia	100	100	100
PL Poland	90	88	87
SI Slovenia	100	100	100

Base: all enterprises. EU-5 = DE, ES, FR, IT, UK. N=502 for EU-5 sector total and 50-100 per country.
Weighting: Figures for size-bands in % of enterprises. Figures for countries are weighted by employment ("enterprises comprising …% of employees"). Reporting period: March/November 2003.
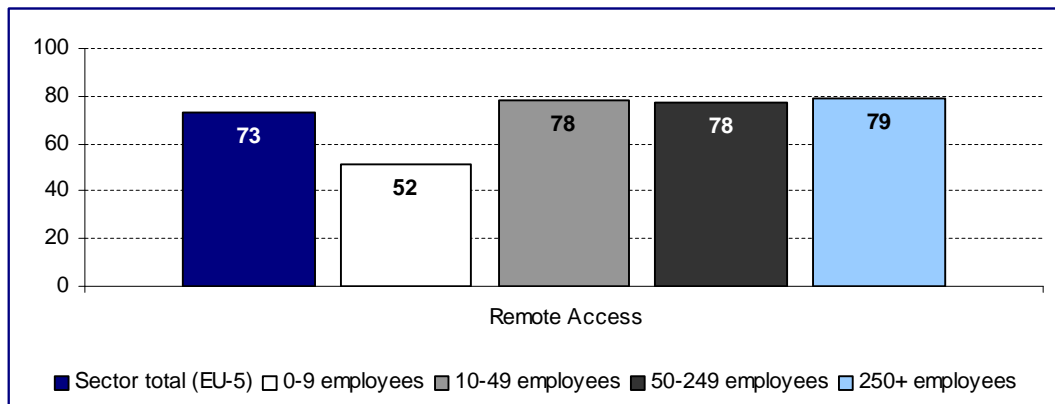
Source: *e-Business W @tch* (2003/04)

Exhibit 2-4: Companies having Internet access (2003)
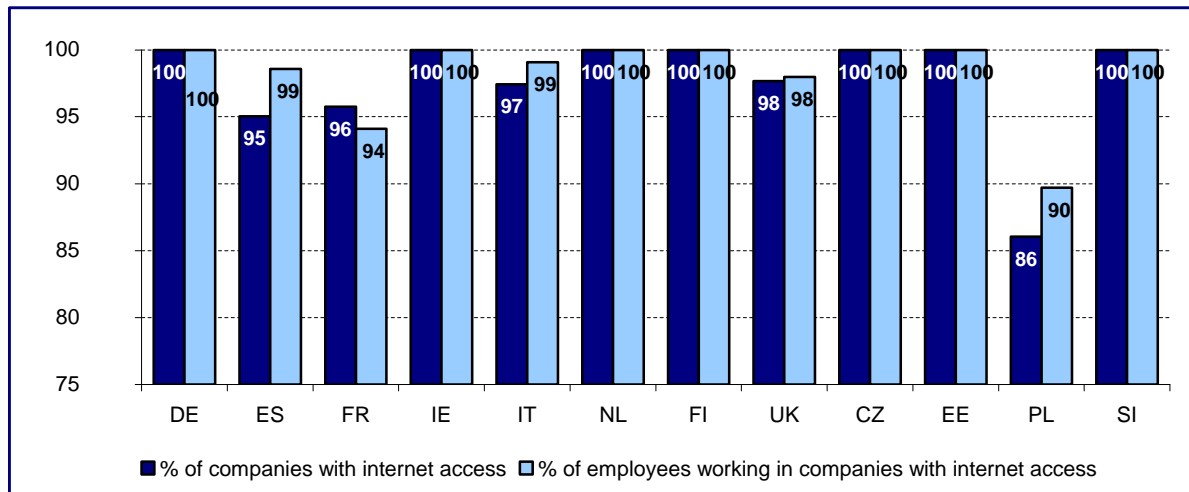
Base: all enterprises (N ~ 50-100 per country). Figures for countries are weighted by employment ("enterprises comprising …% of employees"). Reporting period: March/November 2003.

Source: *e-Business W@tch* (2003/04)

Internet access bandwidth

The quality of e-business solutions is – among other factors – dependant on the network capacity that firms can use. The more bandwidth their systems have, the more comfortable is the use of the network and the more features can be realised. Frustrations and a negative experience with e-business systems often derive from attempts to operate complex systems in low bandwidth networks. Therefore, bandwidth is an important indicator for the quality of infrastructure, especially for e-business adoptions.

The ICT services sector has a greater use of broadband networks than the other sectors monitored by the *e-Business W@tch* (see Exhibit 2-5). More than 5 in 10 employees in the sector work in companies that use more than 2 Mb/s Internet connections. But these companies represent only 26% of the total enterprises of the ICT services. It demonstrates that large companies mainly benefit from broadband connections. The results by enterprise size-class confirm this analysis as 66% of large companies compared to only 25% of micro-enterprises have access to such high-end Internet services. It becomes very clear that broadband access is still primarily available in large enterprises.

In the ICT services sector, broadband connections are crucial for telecom services companies. Generally, they have to transfer or receive large amounts of data to manage daily business operational processes and transactions, for instance billing processes, telecom switching maintenance, or customer relations.

Furthermore, broadband access to Internet is becoming critical for companies that turn more and more to outsourcing for managing some of their activities such as data centre activities (server management, data upgrade and management, storage capacity), disaster recovery management (backup services, physical disaster recovery services), or call centres management.

From the regional point of view, companies in Finland, Estonia, Slovenia, the Netherlands and France seem to benefit from broadband access to a larger extent than their counterparts in Ireland and the UK.

Exhibit 2-5: Quality of Internet connection used by companies (2003)

	Still use analogue dial-up modem	Are connected with <2 Mbps	Are connected with >= 2 Mbps
Sector total (EU-5)			
% of employment	15	38	52
% of enterprises	25	62	26
0-9 employees	26	64	25
10-49 employees	11	39	47
50-249 employees	7	38	53
250+ employees	13	27	66
All (9) Sectors (EU-5)			
% of employment	16	54	31
% of enterprises	27	64	15
DE Germany	6	30	59
ES Spain	5	40	43
FR France	15	31	61
IE Ireland	27	43	43
IT Italy	12	40	55
NL Netherlands	8	22	65
FI Finland	11	13	84
UK United Kingdom	24	47	44
CZ Czech Republic	3	46	48
EE Estonia	4	15	82
PL Poland	15	56	35
SI Slovenia	4	15	82

Base: enterprises connected to the Internet. EU-5 = DE, ES, FR, IT, UK. N=492 for EU-5 sector total and 50-100 per country. Weighting: Figures for size-bands in % of enterprises. Figures for countries are weighted by employment ("enterprises comprising …% of employees"). Reporting period: March/November 2003.

Source: *e-Business W@tch* (2003/04)

Exhibit 2-6: Quality of Internet connection by size-band (2003)
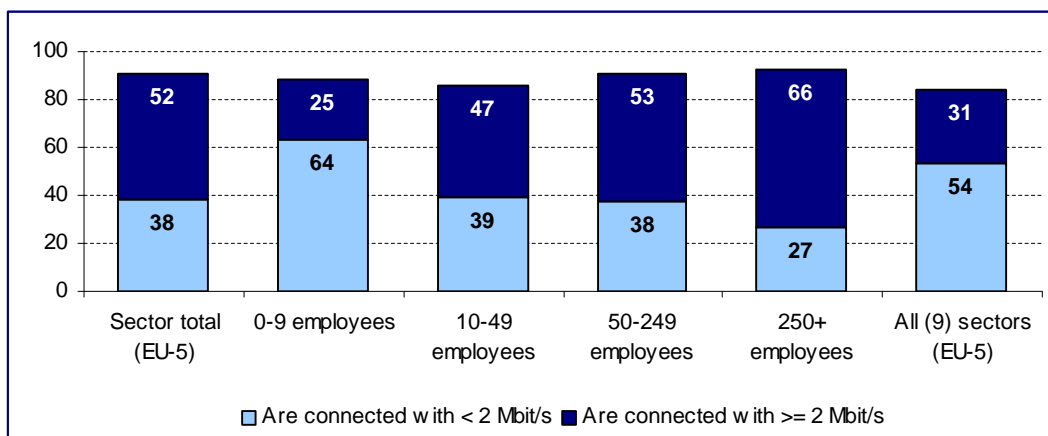
Base: enterprises connected to the Internet. EU-5 = DE, ES, FR, IT, UK. N=492 for EU-5 sector total.
Weighting: Figures for size-bands in % of enterprises. Figures for "Sector total" and "All sectors" are weighted by employment ("enterprises comprising …% of employees"). Reporting period: March/November 2003.

Source: *e-Business W@tch* (2003/04)

ICT skills – demand and supply

The efficient use of IT is one of the core competencies of ICT services firms. The rising complexity of e-business solutions added to rapid technological changes require considerable efforts in training. It is important that companies keep on developing their employees' IT capabilities. Employees in the ICT services sector are particularly privileged as 94% of companies support any kind of IT skills development.

Exhibit 2-7: Companies supporting any kind of IT skills development (2003)
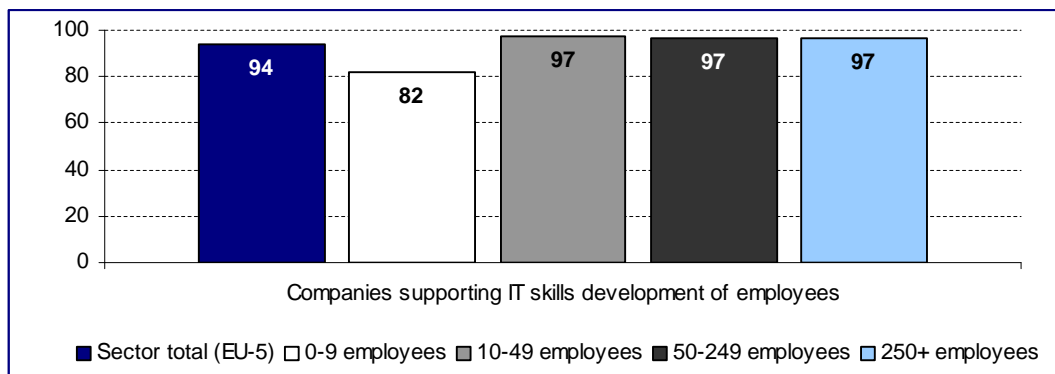
Base: all enterprises. EU-5 = DE, ES, FR, IT, UK. N=502 for EU-5 sector total.
Weighting: Figures for size-bands in % of enterprises. Figure for "Sector total" is weighted by employment ("enterprises comprising …% of employees"). Reporting period: March/November 2003.

Source: *e-Business W@tch* (2003/04)

More than a quarter of the enterprises of the sector (29%) have made efforts to recruit staff with special IT skills during the past 12 month period, which is clearly above the all 9 sector average (9%) in the EU-5. In fact, the percentage could have been expected to be even higher, considering that IT specialists are not only working in the IT departments of firms from this sector, but also as operational staff providing the respective services. In software companies, for example, programmers and developers are all "IT specialists".

Exhibit 2-9 indicates that ICT services sector are rather less impacted by the difficulties of recruiting IT skilled staff. 30% of ICT services companies have experienced difficulties in recruiting IT staff compared to 38% for the all 9 sectors. Large companies find suitable candidates more easily. They benefit from their dynamic image to attract skilled young people, particularly through recruiting campaigns in universities, and usually can offer more attractive salaries than small firms.

It is also worth noting that skills requirements from large companies are often covered by short term contracts with SMEs. Large firms may decide to hire external consultants or engineers for certain tasks, rather than recruiting their own staff. Similarly, large firms may have access to services of their co-operation partners, for example if certain services have already been outsourced. Depending on the case and the requirement, outsourcing strategies imply substantial cost saving potentials, particularly if services can be provided from low wage countries such as India or Malaysia.[17]

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[17] According to Mc Kinsey, a software developer in the U.S., for example, costs $60 an hour whereas one in India only costs $6 an hour. This and other benefits could translate in a net impact of a 50% increase in profits for American businesses. Etude Mc Kinsey, Perspective : Offshore: is it a win-win game?

Exhibit 2-8: Recruitment activities, expected qualifications and outsourcing of IT activities in the ICT Services (2003)

Have made recruitment efforts during past 12 months period (EU-5)

	Have made recruitment efforts during past 12 months period	Of those expected: Academic degree (Master, PhD) *	Of those expected: IT certificate *	Have outsourced some of their IT activities
IE Ireland	61	51	89	40
NL Netherlands	57	54	93	30
FI Finland	67	49	79	52
CZ Czech Republic	62	70	47	60
EE Estonia	67	5	83	82
PL Poland	38	67	40	38
SI Slovenia	59	14	84	84

Base: all enterprises / *enterprises having made recruitment efforts. EU-5 = DE, ES, FR, IT, UK. N=502 / 233 for EU-5 sector total and 50-100 / 28-50 per country. Weighting: Figures for size-bands in % of enterprises. Figures for countries are weighted by employment ("enterprises comprising …% of employees"). Reporting period: March/November 2003.
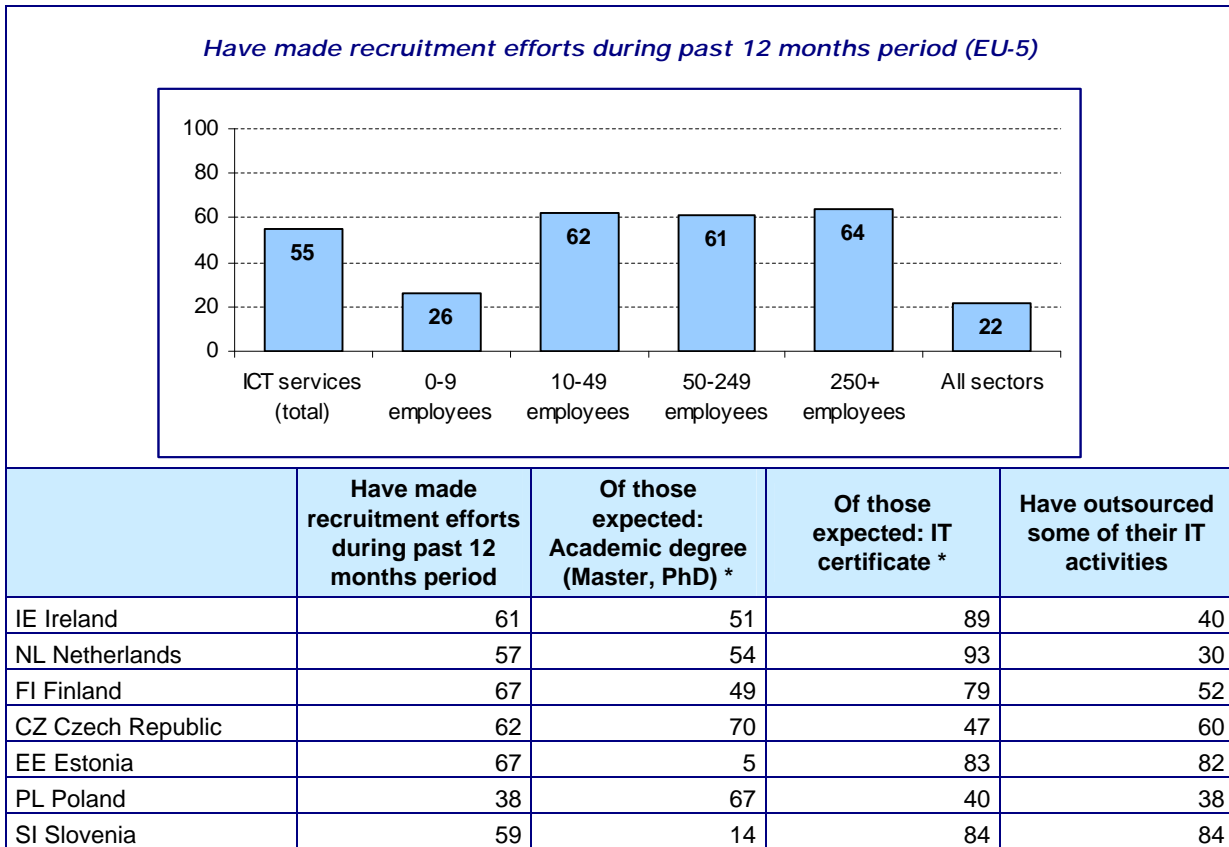
Source: *e-Business W @tch* (2003/04)

Exhibit 2-9: Companies having experienced difficulties in recruiting IT staff (2003)
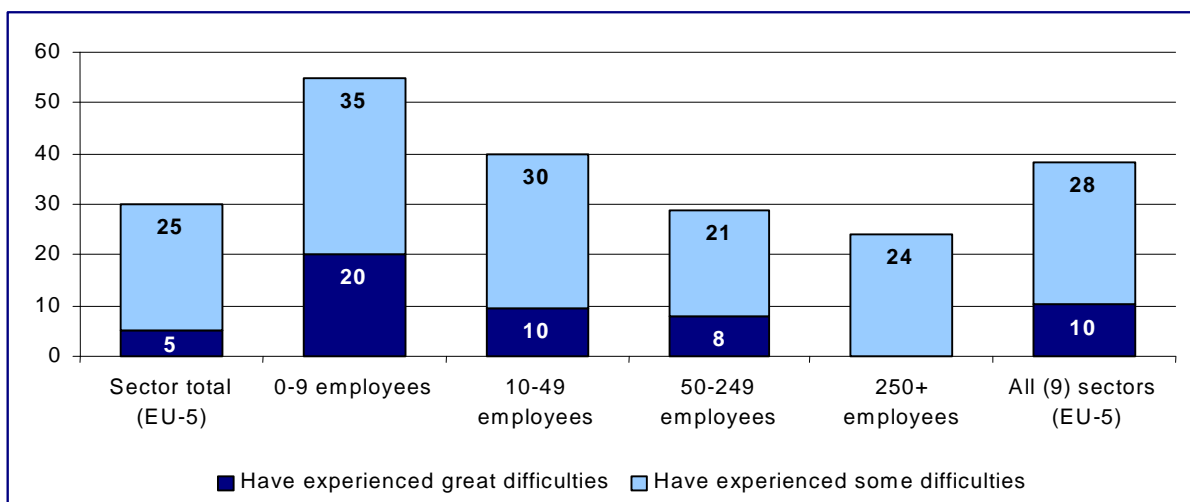
Base: enterprises having made recruitment efforts. EU-5 = DE, ES, FR, IT, UK. N= 233 for EU-5 sector total. Weighting: Figures for size-bands in % of enterprises. Figures for "Sector total" and "All sectors" are weighted by employment ("enterprises comprising …% of employees"). Reporting period: March/November 2003.

Source: *e-Business W @tch* (2003/04)

Globally speaking, the ICT services sector has engaged in larger efforts than all other sectors to recruit skilled people and developed sophisticated strategies, including online recruiting, to find and hire people. Still, 55% of ICT services micro-enterprises (from 0-9 employees) face greater difficulties in finding staff with special IT skills. SMEs have difficulties in retaining their IT people due to higher salaries offered by large companies, even after the end of the new economy frenzy. In some cases, SMEs may have difficulties in accessing the level of expertise that they would need.

But more generally, the difficulties in recruiting staff with IT special skills in the ICT services sector may be related to the evolution of IT business processes and the lack of appropriate skills in the market. The ICT services sector is composed of a myriad of firms providing services addressing sometimes very specific needs. Similarly to the film industry, a growing number of people work as independents and freelancers, and it can frequently be observed that there are various levels of sub-contracting to perform tasks within a contract signed with a single ICT service company. Therefore, assembling the necessary competences and managing them is becoming an increasingly required skill (project management). In addition, large companies have more complex demands for ICT related management skills allowing them to understand how to invest wisely in ICT and how to redesign business processes in order to gain greater productivity gains. Outsourcing is part of the solution to access IT skills.

Outsourcing

Outsourcing is defined as an arrangement in which one company provides services for another company[18] that could also be or usually have been provided in-house. In other terms, outsourcing consists of paying another company to provide services which a company might otherwise have em-ployed its own staff to perform, for example software development. While "outsourcing" does not necessarily imply that the work is performed in another country or even outside Europe, "offshoring" is often used to define the movement of work from companies in industrialised countries to an "offshore" location. Whether outsourcing or offshoring, the main objectives of these activities are either one or several of the following: to achieve cost benefits, to improve the quality of the service, or to increase the speed of service implementation.

IT activities have been offshored for several years. This trend has been particularly important in computer manufacturing industries and in the telecom services sector. For instance, the four tiered process models in the computer-manufacturing sector are commonly used with:

- A design centre located in Western Europe,
- The product development in Eastern European countries or India,
- The components' manufacturing in Malaysia,
- The manufacturing assembly in China.

In the ICT services sector, outsourcing was launched in Europe in the late 1980s by companies such as Accenture, IBM or EDS, which signed big contracts with user industries to take over their IT departments. Multinationals operating in developing and emerging economies, for instance in India and China, consolidated some of their activities based on the concept of global sourcing. In this context, India benefited a lot from the efforts to fight the Y2K bug, and from Foreign Direct Investments (FDI) by large US and the UK corporations.

SMEs of the ICT services sector are not very much involved in this phenomenon except for those having close contacts with these countries, for instance the Chinese and Indian Diasporas. In Europe, Ireland has been the great offshoring success story so far, attracting a lot of FDI mainly from the U.S. and remaining a powerful player in this field.

A significant example of offshore outsourcing in the telecom services sector concerns call-centres. What is relatively new is the offshoring of IT services, traditionally performed by the European

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[18] To a certain extent, we include by "another company", a subsidiary or a newly created company that manage outsourcing services for its parent company or other customers

enterprises such as call-centres and back office operations, but which are now increasingly managed by firms located in less developed countries.

Drivers for offshoring

Several trends militate in favour of IT service offshoring which will make the phenomenon difficult to reverse in the coming years :
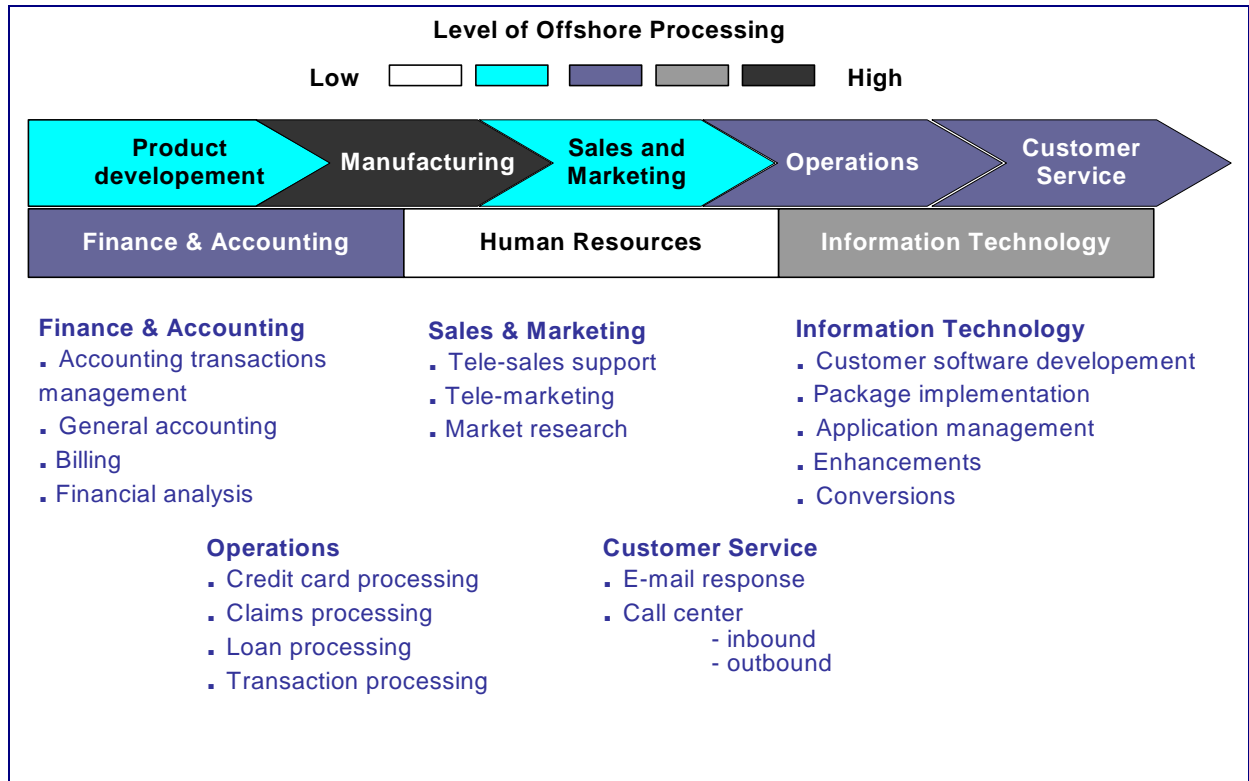
- **Market globalisation:** As the IT market is getting more and more competitive and profit margin decreasing, many companies offshore parts of their IT infrastructure to focus their strategy on their core business competencies. These trends towards specialisation (both of firms and of economic regions) exploit comparative advantages and this improves the overall sector productivity growth.

- **High level of standardisation:** The acceptance of the GSM standard by all European telephone operators (and other geographical areas), IP network technologies and the spread of Open Source contribute to outsource manufacturing and services overseas. Offshoring is expected to get another boost as Western standards become the norm in offshore countries.

- **Development of IT services via Internet:** The Internet – and high-speed Internet connections in particular – make it possible for outsourcing to be accomplished practically anywhere in the world. Broadband data communication networks and cheaper communications enable new forms of software delivery and updating. Downloads have become an alternative to physical software distribution, thus saving distribution costs and increasing customer satisfaction through immediate delivery.

- **Need for agile organisations:** In the ICT services sector, a balanced and well-considered use of offshore outsourcing can have a positive impact on the profitability and competitiveness of firms, as they can better concentrate on their core competencies and allow companies to develop more agile and responsive business models. Whether this will, in the long run, also have positive impacts on employment in Europe is a very controversial issue.

- **The slowdown of the IT market**: With a sluggish IT market growth, adding to the general financial difficulties in the sector, operators are forced to review their strategies and take a series of drastic measures to cut costs and restore market confidence. This leads the IT market players to search for new solutions improving efficiency, such as offshoring solutions.

- **Lack of IT skilled workers:** ICT services companies face difficulties in recruiting IT skilled staff, which can delay the development of their activities. According to the *e-Business W@tch* (Survey 2003), around one third of companies based in Germany, Spain, France, Italy and the UK in the ICT services sector have experienced difficulties in recruiting IT staff. The problem is even more crucial for SMEs. More than half of them faced difficulties in recruiting IT skilled people in the last 12 months and 20% great difficulties in recruiting.

Main offshored IT applications and services

Some IT activities lend themselves to outsourcing beyond the EU more than others, as they do not require a high level of user interaction, at least in comparison to other services and production processes. Among these activities are software development and maintenance, data centre management, call centres, IT testing or package implementation. Exhibit 2-10 shows that IT services rank second after manufacturing in terms of the level of offshore processing. Major outsourcing overseas deals involve labour intensive, routine and repetitive work (like data entry, coding and testing) on mature, well understood systems, for example, associated with the maintenance of legacy systems, that are outside the companies' critical value generation chain.

In fact, IT activities have been offshored for several years, but offshoring of contact centres and back office operations constitute a new trend. As indicated in Exhibit 2-10, customer services (e-mail response, call centre operations), operational processes (credit card processing, transaction processing) are part of the functions in an enterprise that are increasingly offshored.

Exhibit 2-10: Level of offshoring processing

Level of Offshore Processing

Low ▢ ▢ ▢ ▢ ▢ High

| Product developement | Manufacturing | Sales and Marketing | Operations | Customer Service |

| Finance & Accounting | Human Resources | Information Technology |

Finance & Accounting
· Accounting transactions management
· General accounting
· Billing
· Financial analysis

Sales & Marketing
· Tele-sales support
· Tele-marketing
· Market research

Information Technology
· Customer software developement
· Package implementation
· Application management
· Enhancements
· Conversions

Operations
· Credit card processing
· Claims processing
· Loan processing
· Transaction processing

Customer Service
· E-mail response
· Call center
  - inbound
  - outbound

Source: Source: Weissman Center for International Banking at Baruch College and
The Paaras Group, January 2004

IT services offshoring impacts not only the ICT industries but also the overall business functions of companies to a certain level as observed in Exhibit 2-11. Although it is necessary to be cautious with the figures indicated below (small sample of companies), about 60% of these companies have already gone to offshore business functions.

Exhibit 2-11: Main offshored business functions
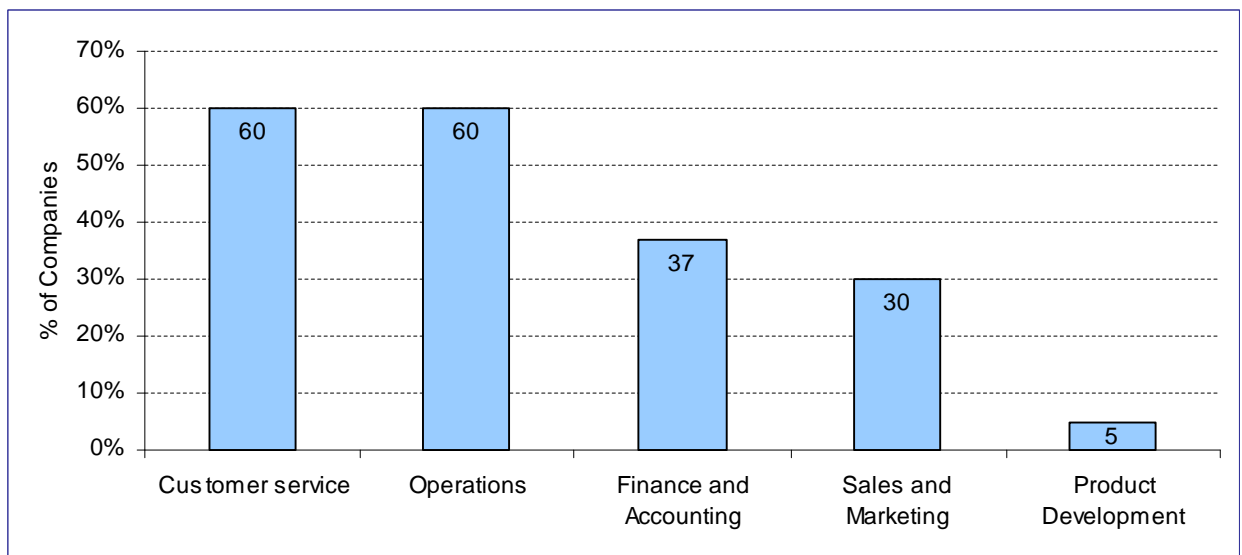
Note: n=38 companies, 30 of which are in North America and eight in Europe.

Source: Weissman Center for International Banking at Baruch College and
The Paaras Group, January 2004 from PwCC survey

2.2.2   Internal business processes

The *e-Business W@tch* concluded in 2003 that "the most significant impacts of e-business currently concern the internal work processes."[19] In fact, most enterprises can benefit from using ICTs for making internal work processes more efficient.

Improving the efficiency of internal business processes is one of the main drivers for e-business in the ICT services sector. This part will analyse the level of usage of e-business applications that contribute to further increase the efficiency of internal business processes such as knowledge management and e-learning solutions, online technologies and ERP systems.

Knowledge management and e-learning

Knowledge management tools can be used to systematically collect specific knowledge of employees and make it accessible to all firm employees, comparable to a firm-specific expertise library. Most of these tools primarily serve to facilitate communication in complex organisations, and they support processes that are mostly found in large firms.

In the ICT sector, more than three quarters of the employees have access to the company's intranet, one third use e-learning applications, and one quarter use knowledge management application; this is far beyond the average of the other sectors. Knowledge sharing is becoming a strategic issue in the ICT sector (see Deutsche Telekom business example below).

Knowledge management and e-learning have close links with the Intranet, as the latter constitutes the basic support of these applications. But despite the large deployment of intranet in companies, it does not mean that employees commonly use knowledge management and e-learning applications. As shown in Exhibit 2-12, only 37% of large companies (more than 250 employees) use knowledge management applications compared to only 6% of micro-enterprises. Generally, e-learning and knowledge sharing is still a large company issue, as SMEs do not implement standardised human resource management and training schemes.

Exhibit 2-12: Knowledge management and e-learning (2003)

	Use an intranet	Use a special knowledge management application	Use an e-learning application
Sector total (EU-5)			
% of employment	77	27	33
% of enterprises	41	7	17
0-9 employees	39	6	17
10-49 employees	65	25	23
50-249 employees	91	28	41
250+ employees	94	37	41
All (9) Sectors (EU-5)			
% of employment	46	10	13
% of enterprises	21	5	5

Base: all enterprises. EU-5 = DE, ES, FR, IT, UK. N=502 for EU-5 sector total and 50-100 per country. Weighting: Figures for size-bands in % of enterprises. Reporting period: March/November 2003.

Source: *e-Business W@tch* (2003/04)

Knowledge management is becoming increasingly critical in computer services sector to speed up time-to-market of new products and services and/or ease the programming of new software. To create or sustain competitive advantage, companies now need to shorten the time between data analysis and action – in other words, turn data into actionable intelligence. IT consulting and software programming are knowledge-based activities, and efficient knowledge management is crucial in such a sector.

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[19]   The European E-Business Report 2003. p. 24f.

Improving the flow and the management of knowledge is vital in the ICT services as companies produce their high added value services mainly from skilled labour. The rapid technological changes and innovations in the ICT services sector required vast amounts of information and knowledge sharing from different locations. Companies need a central point of integrated information access that can translate corporate knowledge into corporate success.

Exhibit 2-13: Knowledge management: Use of intranets and special applications in the ICT Services by country (2003)
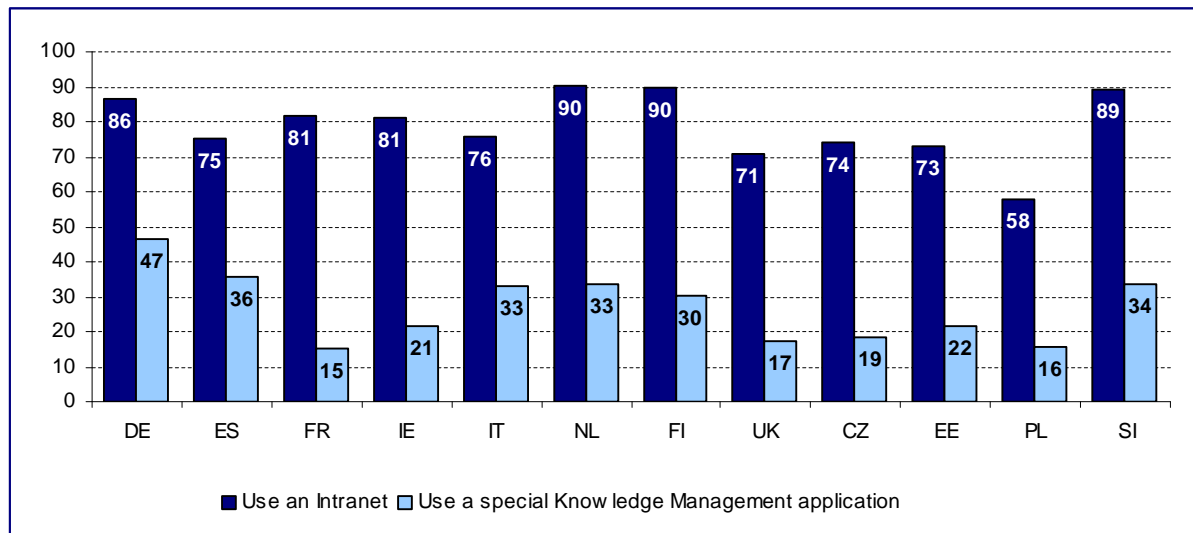
Base: all enterprises (N ~ 50-100 per country). In % of enterprises. Reporting period: March/November 2003.

Source: *e-Business W@tch* (2003/04)

Business example

E-learning at Deutsche Telekom : a portal to knowledge

E-learning applications in ICT services companies date back several years. Since 1985, Deutsche Telekom has introduced e-learning for regular and advanced training courses throughout every level of the company including management. Today, the portfolio ranges from customized training products, to technical, business administration and commercial topics, to units on quality management, project management and human resources management.

E-learning content and applications are accessible via an e-learning portal offering functionalities such as tutorial support, live chats and daily updated forums. Employees still have access to supplementary information and can secure their required knowledge on an on-going basis.

The learning platform comprises more than 320 Web-based training courses. All registered users have access to individual training programmes according to their training needs and can access a varied mix of media and techniques; for example, participants are connected to a "virtual classroom" where they can follow the trainer's explanations, with additional support from relayed charts, graphs and animated presentations. When needed, interactive satellite TV or Web-TV are used to target large groups.

Source : Deutsche Telekom, Annual report 2002

Use of online technologies to support internal business processes

Regarding the use of online technologies to support internal business process, firms from the ICT services sector again show a higher maturity than in other sectors monitored by the *e-Business W@tch*. Two thirds of the employees of the ICT services sector work in companies that use online technologies to share documents or for collaborative work compared to only 40% of the employees on average in all sectors.

Online technologies can particularly improve efficiency in the framework of projects realised by different working sites at different or remote locations, which is quite common in the ICT services. This argument is confirmed by the fact that there is no great difference between large companies and SMEs in the way they use document sharing and collaborative work. Almost half of micro-enterprises are using them for sharing documents internally or for collaborative work.

The number of companies using automated travel reimbursement is four times higher than in other sectors (see Exhibit 2-14). That may show a large relocation of production sites but also a willingness to better reduce travel cost and improve internal efficiency. Slovenia, the Netherlands, Finland and Estonia seem to be leaders in the use of online technologies to support internal business processes while France and Poland appear to be late adopters.

Exhibit 2-14: Use of online technologies to support internal business processes in the ICT Services (2003)

	To share documents internally / for collaborative work	To automate travel reimbursement	To track working hours / production time	To support human resources management
Sector total (EU-5)				
% of employment	67	30	43	42
% of enterprises	47	13	20	16
0-9 employees	45	13	19	14
10-49 employees	67	19	28	37
50-249 employees	65	27	45	41
250+ employees	78	41	57	57
All (9) Sectors (EU-5)				
% of employment	40	11	20	21
% of enterprises	22	3	5	5
DE Germany	77	60	68	53
ES Spain	71	38	26	34
FR France	56	7	33	29
IE Ireland	68	38	39	56
IT Italy	71	36	42	40
NL Netherlands	82	36	52	55
FI Finland	84	57	83	77
UK United Kingdom	65	21	41	47
CZ Czech Republic	66	8	40	40
EE Estonia	85	19	55	39
PL Poland	68	21	6	25
SI Slovenia	93	25	74	65

Base: all enterprises. EU-5 = DE, ES, FR, IT, UK. N=502 for EU-5 sector total and 50-100 per country. Weighting: Figures for size-bands in % of enterprises. Figures for countries are weighted by employment ("enterprises comprising …% of employees"). Reporting period: March/November 2003.

Source: *e-Business W@tch* (2003/04)

Use of ERP systems

Enterprise Resource Planning (ERP) is a software system that helps to integrate and cover all major business activities within a company, including product planning, parts purchasing, inventory manage-ment, order tracking, human resources, project management, and finance. ERP consists of cross-industry applications that automate a firm's business processes (see Telenor business example below).

In the ICT services sector, only 21% of the employees work in companies using ERP systems. ERP is mainly used in large companies that have to manage more complex supply chain including physical supplies. That may explain the average ranking of the ICT services sector. ERP systems are especially employed in telecom services companies, which often deal with complex technologies and a large number of customers as shown by the business example on Telenor.

> *Business example:*
>
> *Telenor (Norwegian telecommunication operator): from technical problem detection to automatic customer information*
>
> *The integration and data processing of internal information enabled by ERP applications have an overall effect on ICT service management. For instance, Telenor has implemented software application in its networks division to collect and consolidate status data from 200 switches and to help automate the identification and prioritisation of service-affecting alarms. This solution integrates an automated call handling system to inform customers about what the problem is and when it will be fixed, avoiding the need for the call to be answered by a human operator.*
>
> *The solution also gives detailed diagnostic information to customer care staff when a fault cannot be reported automatically, and where possible, the solution attempts to resolve the problem before it affects a customer. The solution is an important part of the telecom operators' cost reduction programmes.*
>
> *Source : Telenor Annual Report 2002*

As a knowledge-based sector, telecom services and computer companies need to constantly optimise their information process and human capital to keep a competitive advantage in the market. This requires integrating information and employee management with business processes. The BEA business example suggests that ERP systems enable corporations to more effectively align employee and business objectives by deploying the right people to meet company goals.

Exhibit 2-15: Companies using an ERP (enterprise resource planning) system (2003)
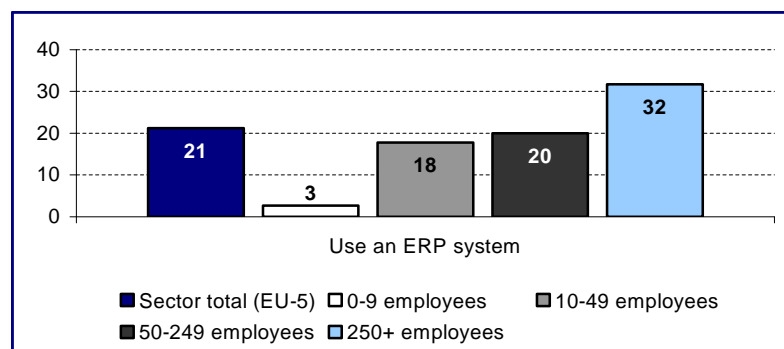
Base: all enterprises. EU-5 = DE, ES, FR, IT, UK. N=502 for EU-5 sector total. Weighting: Figures for size-bands in % of enterprises. Figure for "Sector total" is weighted by employment ("enterprises comprising …% of employees").
Reporting period: March/November 2003.

Source: *e-Business W @tch* (2003/04)

> ### Business example:
>
> **BEA System (e-business infrastructure software company):**
>
> *In the computer services sector, ERP application can also contribute to important resources optimisation and cost reductions. For example, BEA, the e-business software company selected a suite of software designed to optimise service business processes, to help manage the flow of information in its professional services business. The company expects to have more control over the cost of providing services, and to run a more efficient and profitable global services operation.*
>
> *From past experience, BEA relied on a series of spreadsheets for resource and engagement management. Each BEA office managed its own resource pool with names, contact information, and skill sets. While the system worked fine, cost and profitability information was not readily available, and assigning resources across regions was not as efficient as it should have been.*
>
> *With the new solution, BEA has an enterprise-wide view of its consulting resources and data via the web. So with one click, the company can find the right person to work on a project, track the project's progress, manage contract steps, control time and expenses, and analyse costs and profits. Based on Internet, the ERP solution makes everything online so employees can access information anytime, anywhere.*
>
> *The solution is particularly well adapted to remote consultants who are in the field, and not physically at their offices. They need software that runs on the web. Through a web browser, consultants can get information on the go. ERP solutions help to assign the right people on the right project, regardless of where they are physically located. This software application optimises resources based on skill set, availability, and cost.*
>
> *Source : www.peoplesoft.com*

2.2.3   Procurement processes and supply chain management

In a competitive global market, procurement processes and supply chain management systems are of increasing importance. This holds true for the ICT services sector. E-business solutions can effectively contribute to enlarge global sourcing opportunities and access to quality standard supplies at lower costs.

Buy-side electronic commerce activities

The ICT services sector ranks first regarding online purchasing and e-procurement usage compared to the other sectors studied by the *e-Business W@tch*. Three quarters of enterprises make online purchases, which is more than twice the rate compared to the other sectors (on average). Moreover, online buying is equally used for both direct production goods and MRO goods. There are two important factors that support and drive online purchasing activities in the sector.

- Firstly, ICT services companies are very well equipped with broadband connections. Thus, many inputs which are necessary for the provision of ICT services can easily be obtained through the Internet in spite of high bandwidth demand (for instance standard software, hosting services, Internet and telecommunication services, books, database content, research).

- Secondly, the "natural" familiarity of ICT services companies with the possibilities of the Internet makes online ordering a logical thing to do.

Online buying is also well used by SMEs from the sector. 80% of small companies (10-49 employees) and 73% of large firms purchase online. However, online purchasing of small and large companies is fundamentally different. In large companies, online buying implies the existence of integrated procurement systems. For instance, when Telecom Italia launches online tenders via its corporate Internet site, it allows suppliers to know of both offers and the final results in real time, thus making

mutual relations even more transparent between players. In SMEs, online buying is often a rather simple, "manual" buying process via websites from suppliers.

From the regional point of view, companies in Germany, the Czech Republic and Finland have a high propensity towards online purchasing, while companies in Spain, Poland, France and Ireland seem to be more hesitant.

Exhibit 2-16: Online purchasing activities by companies (2003)

	Make online purchases	Of those: online purchase of MRO[20] goods*	Of those: online purchase of direct production goods*
Sector total (EU-5)			
% of employment	74	70	59
% of enterprises	75	70	62
0-9 employees	74	70	62
10-49 employees	80	72	62
50-249 employees	71	69	55
250+ employees	73	70	58
All (9) Sectors (EU-5)			
% of employment	46	62	50
% of enterprises	31	60	53
DE Germany	92	76	55
ES Spain	51	71	60
FR France	60	66	65
IE Ireland	58	74	42
IT Italy	72	67	63
NL Netherlands	84	78	53
FI Finland	90	46	58
UK United Kingdom	80	70	57
CZ Czech Republic	92	70	63
EE Estonia	77	52	35
PL Poland	55	59	69
SI Slovenia	75	46	52

Base: all enterprises /*enterprises procuring online. EU-5 = DE, ES, FR, IT, UK. N=502/259 for EU-5 sector total and 50-100 / 30-80 per country. Weighting: Figures for size-bands in % of enterprises. Figures for countries are weighted by employment ("enterprises comprising …% of employees"). Reporting period: March/November 2003.

Source: *e-Business W @tch* (2003/04)

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[20] Maintenance, repair and operations goods (indirect production goods)

Exhibit 2-17: Companies from the ICT Services making online purchases by country (2003)
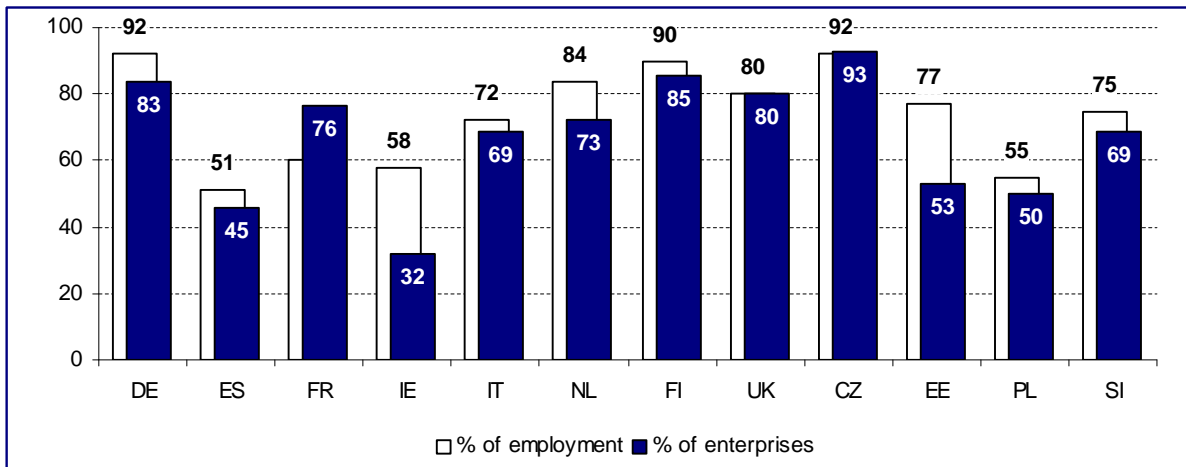
Base: all enterprises. N ~ 50-100 per country. Reporting period: March/November 2003.

Source: *e-Business W@tch* (2003/04)

Distribution platforms and protocols used for purchasing online

As in the other economic sectors, the ICT services sector uses different networks and platforms to purchase online, such as suppliers' websites, B2B marketplaces, extranets or EDI based ordering systems.

In the ICT services sector, almost every company (96%) that makes online purchases has bought from a supplier's website. This is a very simple and common way to buy virtual or material goods. One in four companies that buy online use their supplier's extranet. This method is used by larger companies more than by SMEs, as they have more important orders to place with suppliers. For instance, telecom operators work closely with telecom manufacturers for building and running their IT communication networks.

Exhibit 2-18: Distribution platforms and protocols used for online purchases
in the ICT Services (2003)

	Website of suppliers	B2B Market-places	Extranet	EDI
Sector total (EU-5)				
% of employment	93	30	43	9
% of enterprises	96	25	25	4
0-9 employees	97	24	25	4
10-49 employees	88	29	35	13
50-249 employees	89	26	38	5
250+ employees	94	34	55	11
All (9) Sectors (EU-5)				
% of employment	88	24	28	6
% of enterprises	85	21	22	3

Base: enterprises making online purchases. EU-5 = DE, ES, FR, IT, UK. N=359 EU-5 sector total. Weighting: Figures for size-bands in % of enterprises. Reporting period: March/November 2003.

Source: *e-Business W@tch* (2003/04)

About one quarter of the companies purchasing online makes use of B2B marketplaces on the Internet. Regarding the procurement of MRO goods, ICT services companies can use exactly the same B2B market places as other enterprises for buying inputs. They can, for example, order office supplies or other indirect production goods on horizontal market places, or they can use sourcing

solution providers such as Freemarkets (www.freemarkets.com) or Portum (www.portum.com) to conduct procurement auctions with a selected set of potential suppliers. However, there are three forms of specific intermediaries that are parts of the ICT services industry. They are:

- Bandwidth marketplaces for telecommunications: capacity of all sorts of telecommunication networks. As many carriers have invested more in bandwidth than they actually needed, many carriers now have excess capacity or at least cheap access to excess capacity.

- Software-related marketplaces for expert knowledge: the function of those marketplaces is to match potential buyers (organisations or individuals working on a software development project or looking for improvement of an existing solution) and sellers (the freelance developer community or companies offering programming services).

- Internet-based intermediaries for software, research and similar non-physical products: for instance, research report, white papers, software components (small pieces of reusable software that provide a strictly limited set of functionality), software for end users.

Regarding EDI applications, ICT services companies do not predominantly use EDI for several reasons. Firstly, the sector is largely composed of small and new computer companies, which are more familiar with web-based online tools. Secondly, a large amount of activity in the sector is project-based, which does not lend itself to more structured EDI-based transactions.

Share of online purchases among total purchases

From those enterprises that make online purchases, 29% say they buy more than 50% of their total purchases online (see Exhibit 2-19). This percentage is significantly higher than in other sectors and demonstrates the importance of e-procurement in the ICT services sector and the high degree to which transaction processes in the sector value chain are digitised.

Exhibit 2-19: Share of online purchases (all platforms)
as % of total purchases in the ICT Services (2003)
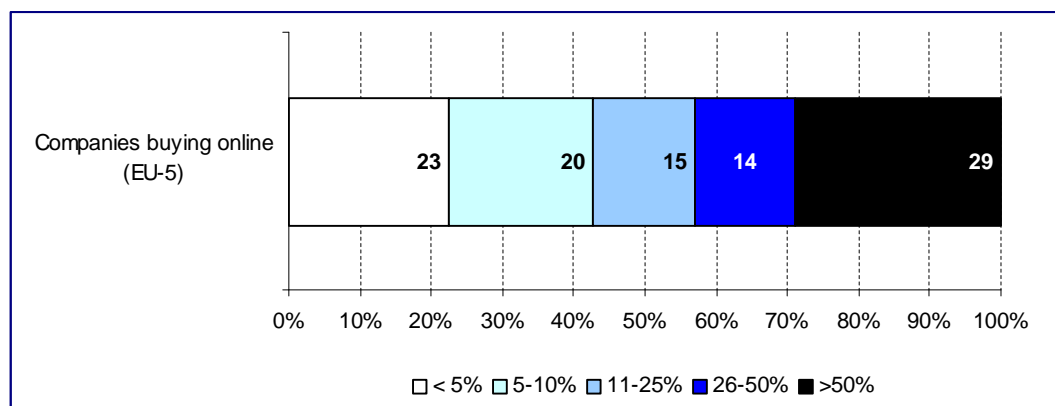
Base: enterprises making online purchases. EU-5 = DE, ES, FR, IT, UK. N=359. In % of enterprises.
Reporting period: March/November 2003.

Source: *e-Business W@tch* (2003/04)

Business process integration in e-commerce (buy-side)

The ICT services sector is ahead of other sectors in integrating electronic purchasing processes. One in two companies of the sector commonly use online technologies to exchange documents with suppliers, a basic form of integrating processes in the supply chain. But even with its leading position, integration of IT systems with that of suppliers and Supply Chain Management are still an emerging technology, which less than 10% of enterprises have put into practice.

As in all sectors, the level of IT integration with the suppliers varies greatly according to the class size of enterprises. Small enterprises (with less than 10 employees) order mainly on the website of the

supplier. Medium-sized companies prefer exchanging documents online (using technologies other than e-mail), and large companies use mainly integrated solutions such as SCM or Extranets.

Exhibit 2-20: IT integration with suppliers (2003)
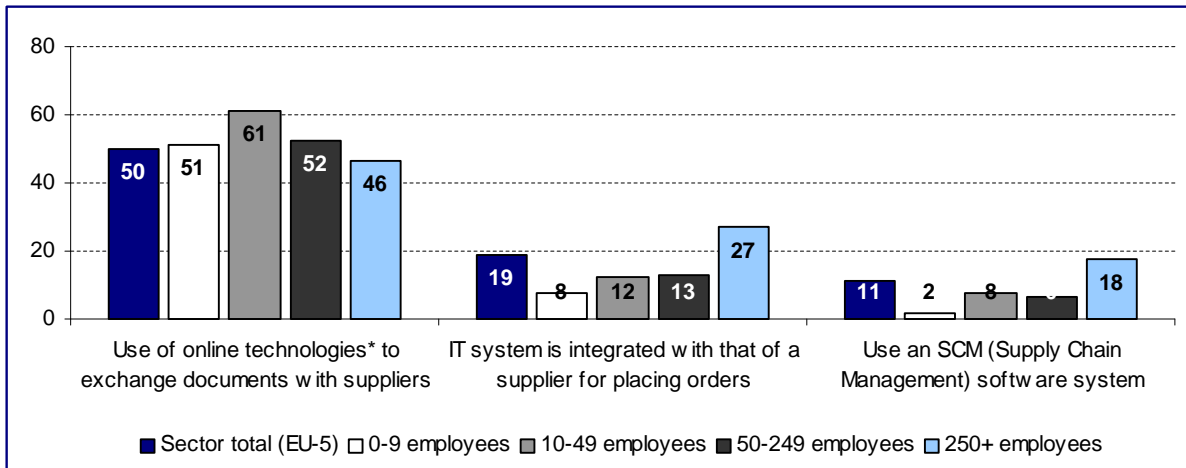
* other than free text e-mail

Base: all enterprises. EU-5 = DE, ES, FR, IT, UK. N=502 for EU-5 sector total. Weighting: Figures for size-bands in % of enterprises. Figure for "Sector total" is weighted by employment ("enterprises comprising …% of employees").
Reporting period: March/November 2003.

Source: *e-Business W@tch* (2003/04)

Business example:

SFR (French mobile operator): a demand driven supply chain

In the late 1990s, the mobile telecommunications sector, until then limited to the professional users market, began to target the general public. To succeed, SFR needed to deploy retail outlets, develop imaginative marketing strategies, and manage increased volumes of handheld phones throughout its entire supply chain that is all the way from the package assembly subcontracting to distribution to end users, in order to respond to the changing demand of the retail outlets.

To avoid losing any potential clients, SFR knew it had to be sure of having the right product in the right quantity at the right place at all times, with very little margin for error. As the operator subsidized the cellular phone itself, and the cost of each cell phone is relatively high, the financial impact of having either too much or too little stock in the retail outlets would have been severe.

The core objectives of the reorganization project were to implement sales planning processes within SFR in order to create a demand-driven supply chain, enhance and accelerate demand forecasting for both end products and raw materials, and ensure faster response to market changes.

The company experienced numerous and measurable benefits throughout the supply chain as a result of implementing a global software solution. Upstream, it manages 6 000 different raw material items, and downstream, it manages some 2 500 finished products, and 15 000 retails outlets.

Source : SAP www.sap.com/contactsap

Supply chain management (SCM) solutions promise to give firms an integrated view of their supply processes, including the movement of materials, related information (ordering status) and finances. SCM application dynamically integrates demand and supply management, targets customers to boost revenue, and link order management with planning and forecasting. The key enablers of an adaptive supply chain are small and flexible operations, end-to-end visibility of supply and demand, collabo-

ration, event-based management and integrated technology. In the ICT services sector, creating an adaptive supply chain approach is important today, especially in the markets where the demand is hard to forecast (see the SFR business example).

From a regional point of view, companies located in small countries such as Estonia, Ireland, Finland and the Netherlands are well positioned as more than two thirds of their employees use online technologies to exchange documents with suppliers (other than free text e-mail). Companies in Germany and Spain seem to be ahead of the others in the integration of their IT system with that of their suppliers and in implementing SCM. More than 20% of their employees use these applications. On the other hand, firms in France and the Czech Republic fall clearly behind in the domain of IT integration with suppliers.

Exhibit 2-21: IT integration with suppliers (2003)

	Use of online technologies* to exchange documents with suppliers	IT system is integrated with that of a supplier for placing orders	Use an SCM (Supply Chain Management) system
Sector total (EU-5)			
% of employment	50	19	11
% of enterprises	52	8	2
0-9 employees	51	8	2
10-49 employees	61	12	8
50-249 employees	52	13	6
250+ employees	46	27	18
All (9) Sectors (EU-5)			
% of employment	37	8	6
% of enterprises	24	6	2
DE Germany	51	46	26
ES Spain	59	20	18
FR France	40	6	2
IE Ireland	81	10	27
IT Italy	54	12	4
NL Netherlands	66	30	10
FI Finland	67	30	8
UK United Kingdom	52	15	11
CZ Czech Republic	42	9	1
EE Estonia	83	12	18
PL Poland	45	12	9
SI Slovenia	59	8	3

* other than free text e-mail

Base: all enterprises. EU-5 = DE, ES, FR, IT, UK. N=502 for EU-5 sector total and 50-100 per country.

Weighting: Figures for size-bands in % of enterprises. Figures for countries are weighted by employment ("enterprises comprising …% of employees"). Reporting period: March/November 2003.

Source: *e-Business W @tch* (2003/04)

Perceived impacts of purchasing online

The e-Business Survey 2003 included some qualitative questions to assess the perceived effects of purchasing online on the cost of logistics, the efficiency of processes and the relations to suppliers and procurement costs.

Exhibit 2-22 shows the opinion of enterprises about these effects. In theory, e-procurement is expected to reduce purchasing costs, thus making internal processes more efficient. This could have

significant impacts on the overall productivity of adopting companies. According to the e-Business Survey, the assessment of online purchasing was very positive. In fact, around two thirds of ICT companies consider that online purchasing has had a positive impact on their activities. As expected, the biggest perceived impacts relate to the procurement costs and the efficiency of processes. The perceived effect of online purchasing is still positive with respect to supplier relations, but to a lesser extent than regarding procurement costs and process efficiency.

Exhibit 2-22: Perceived effects of purchasing online in the ICT Services (2003)

Base: enterprises making online purchases. EU-5 = DE, ES, FR, IT, UK. N=359. In % of enterprises.
Reporting period: March/November 2003.

Source: *e-Business W@tch* (2003/04)

Exhibit 2-23 indicates that e-purchasing leads more often to a reduction of suppliers than in other sectors. 15% of companies that make online purchases reported that their number of suppliers has decreased with the use of e-purchasing. However, 40% say it has increased.

Exhibit 2-23: Reported effect of e-purchasing on the number of suppliers (2003)
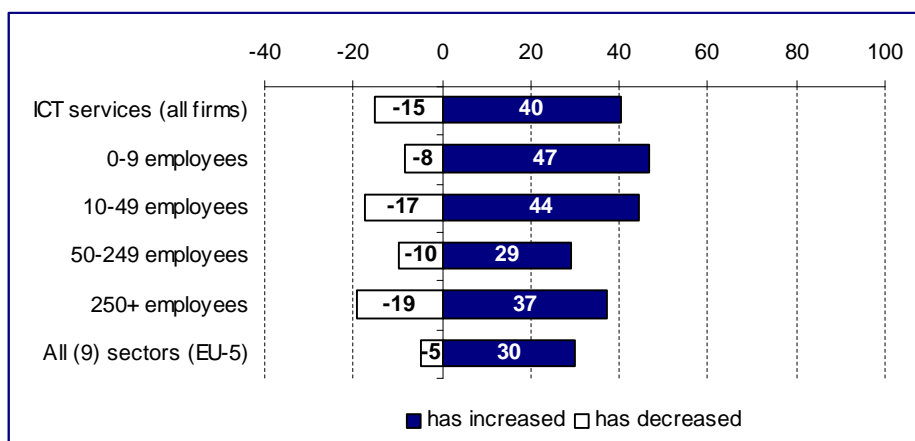
Base: enterprises making online purchases. EU-5 = DE, ES, FR, IT, UK. N=359. Weighting: Figures for size-bands in % of enterprises. Figures for "Sector total" and "All sectors" are weighted by employment ("enterprises comprising …% of employees"). Reporting period: March/November 2003.
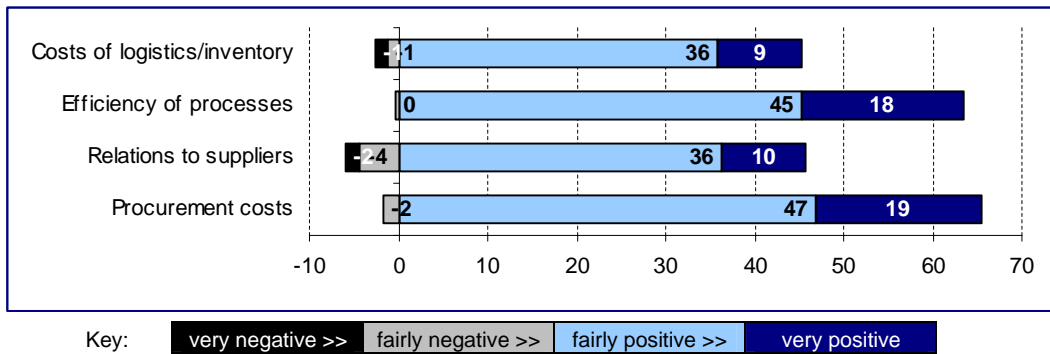
Source: *e-Business W@tch* (2003/04)

2.2.4 Marketing and sales

The Internet provides excellent tools for marketing. Customers can be approached via the Internet. Moreover growing broadband connections facilitate multimedia interactive features with a broad range of production information (examples of electronic catalogues) and with individualised customer care services. To take advantage of the opportunities offered by e-commerce, in particular for sectors that trade ICT service firms seek to attract as many potential customers as possible to their websites. ICT service companies benefit greatly from e-marketing to globally promote and sell their products.

Websites

More than 66% of ICT services companies have implemented a website on the Internet, which is almost twice the rate of the all sector average. As is well known, ICT services companies have integrated websites in their marketing and commercial policies in a more sophisticated way than most other sectors. This applies to small companies as well.

The functions of websites can go beyond the mere provision of information on products and services, and on the company itself. IT consulting firms, for instance, often make considerable amounts of research information 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, whereby the main functionalities and types of interactions with customers are different for the various sub-sectors of the ICT services sector. Software companies, for example, allow customers to download software updates or trial versions of software with limited functionality or validity time, or drivers and plug-ins. They also have direct access to technical support, consult knowledge bases, and participate in user forums.

Websites allow telecom operators to address their large consumer markets with a broad range of communication services (e.g. Internet access for residential users). They all offer access to their services and products, giving customers the opportunity to monitor their phone bills, to consult past telecommunication data or to change to a new tariff option, and to pay their bills online. Simiarly, ISPs (Internet service providers) essentially manage all their client relationships through their own websites.

Online sales

Selling products and services online is considerably affecting the ICT services industry in areas such as delivery channels, pricing strategies, and customer services. This is particularly true in mobile phone and Internet access markets where competition is fierce and where rapid commercial response to changes in the marketplace has become a key asset to staying in the market. Usually online sales channels combine a large variety of additional customer (self)-services, promotion and online billing services.

But even in the ICT services sector, online sales are not as widespread as online procurement. Only 15% of firms offer online sales facilities to their clients (while 75% of companies in the sector buy online themselves). The exceptions to this finding are software companies. Due to its digital nature, software is a particularly well adapted product for online selling. Once ordered, the software can be directly downloaded (or delivered by mail) from the seller's website. Most of the largest software companies run web shops, while small software publishers and computing companies often rely on direct relationship with their clients and traditional distribution channels.

In the telecommunications sector, operators sell practically all of their services online such as mobile phone or fixed network broadband subscriptions. On the business market, they usually offer products and services through their own website or via extranets, depending on the size of potential customers.

Not all ICT companies that make online sales have implemented a secure transaction system. About two thirds of the companies selling online have set up secure transaction capability. This is far beyond the level observed in other sectors. Once again, the ICT services sector appears as a pioneer in adopting new sophisticated online solutions. The widespread use of the Internet and Intranets in the

sector also has led to a greater focus on security requirements. Furthermore, the growth of e-commerce activity increases this concern, as ICT service firms seek to attract as many potential customers as possible to their websites.

Currently, there is a gap between large and small ICT services companies in the development of online selling. 30% of large companies, compared to 15% of small ones sell online. From a regional point of view, firms from Germany, the Netherlands, Finland and Estonia appear to be leaders in secure e-commerce. More than 30% of companies from the sector have implemented secure payment solutions, while firms in France and Italy rank low in the e-Business Survey 2003 in that respect.

Exhibit 2-24: Online marketing and e-commerce activities (2003)

	Have a website on the Internet	Make online sales	Allow online payment of goods/services ordered	Online sales system with secure transactions capability
Sector total (EU-5)				
% of employment	88	24	13	16
% of enterprises	69	15	10	9
0-9 employees	67	15	10	10
10-49 employees	89	20	10	7
50-249 employees	95	20	6	11
250+ employees	95	30	17	23
All (9) Sectors (EU-5)				
% of employment	66	16	7	9
% of enterprises	36	10	4	4
DE Germany	97	44	11	31
ES Spain	84	26	20	20
FR France	86	19	7	7
IE Ireland	88	41	36	37
IT Italy	83	10	6	6
NL Netherlands	97	56	14	36
FI Finland	97	54	30	34
UK United Kingdom	88	21	19	18
CZ Czech Republic	94	22	6	11
EE Estonia	95	35	25	32
PL Poland	84	37	15	15
SI Slovenia	90	36	18	24

Base: all enterprises. EU-5 = DE, ES, FR, IT, UK. N=502 for EU-5 sector total and 50-100 per country. Weighting: Figures for size-bands in % of enterprises. Figures for countries are weighted by employment ("enterprises comprising …% of employees"). Reporting period: March/November 2003.

Source: *e-Business W@tch* (2003/04)

Exhibit 2-25: Companies selling online by country (2003)
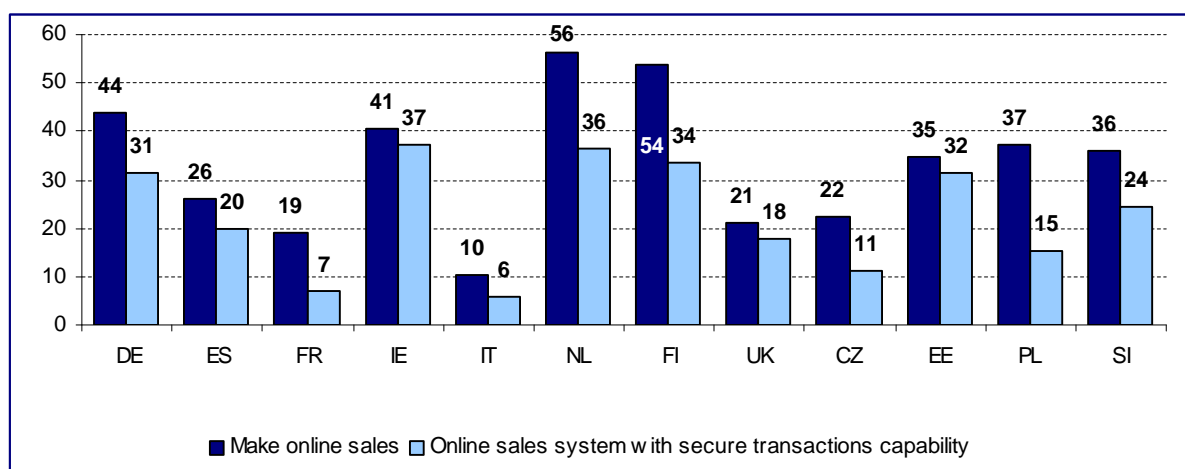
Base: all enterprises (N ~ 50-100 per country). In % of enterprises. Reporting period: March/November 2003.

Source: *e-Business W@tch* (2003/04)

Types and relative importance of online sales

Only about a quarter of enterprises that make online sales use B2B marketplaces to sell their products and services. These are, notably, very large firms from the sector which resell excess network capacities via bandwidth marketplaces.

Selling services through extranets is used by only 8% of ICT services enterprises selling online, which is similar to other sectors (4%). In ICT services, extranets are mainly used for project development processes in computer related activities, while in the telecom (sub-)sector they are now used for after sales processes. For instance, some mobile telecom operators allow their business clients to manage a mobile float on the operator's extranet (adding a mobile phone, changing the type of subscription, and so on).

Exhibit 2-26: Distribution platforms and protocols used for online sales in the ICT Services (2003)

	Own company website	B2B Market places	Extranet	EDI	Mobile services (e.g. WAP)
Sector total (EU-5)					
% of employment	88	48	42	24	8
% of enterprises	88	24	8	4	4
0-9 employees	90	23	8	4	4
10-49 employees	66	29	6	2	5
50-249 employees	83	27	27	6	3
250+ employees	92	60	59	36	12
All (9) Sectors (EU-5)					
% of employment	81	34	15	14	6
% of enterprises	79	38	4	5	1

Base: enterprises selling online. EU-5 = DE, ES, FR, IT, UK. N=102 for EU-5 sector total, N=11-41 per country. Weighting: Figures for size-bands in % of enterprises. Reporting period: March/November 2003.

Source: *e-Business W@tch* (2003/04)

In addition, selling via mobile devices is not yet widely developed (only 1 in 25 companies that sell online use mobile devices as a sales channel). However, this activity could increase in the future, especially for companies which target consumer markets. Mobile operators which have to manage large customer bases can easily market customers directly on their mobile device. One of the main

barriers, though, is secure transactions over mobile networks, in particular if the value of a transaction is higher than 10 euro. Only 9% of companies provide online sales system with secure transactions capability.

Another indicator of the comparative maturity of the sector with respect to marketing and selling online is the – relatively – high share of sales as percent of total sales. About 26% of those firms from the sector that make online sales say that e-commerce related transactions already account for more than 25% of their total sales.

Exhibit 2-27: Share of online sales (all protocols) as % of total sales in the ICT Services (2003)
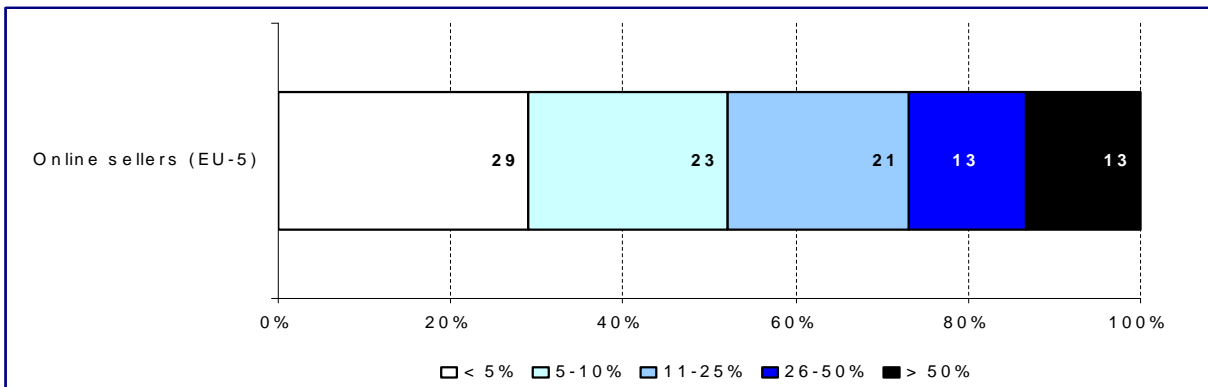
Base: enterprises selling online. EU-5 = DE, ES, FR, IT, UK. N=102. In % of enterprises.
Reporting period: March/November 2003.

Source: *e-Business W@tch* (2003/04)

Business process integration in e-commerce (sell-side)

As in other sectors, e-mail exchanges constitute an important part of online sales systems used by companies. 63% of those ICT services firms that sell online say that they are informed about incoming orders by e-mail. More importantly, almost a quarter of the enterprises selling online declared that they have integrated the ordering with their back end system. This is a major step in the level of sophistication of the application, confirming that the sector is far ahead of all other sectors studied.

Exhibit 2-28: Business integration of online sales systems in the ICT Services (2003)

	Information about order by fax	Information about order by e mail	Ordering system integrated with back end system	Other
Sector total (EU-5)				
% of employment	3	51	34	3
% of enterprises	8	63	23	4
0-9 employees	8	64	25	3
10-49 employees	10	56	2	17
50-249 employees	4	65	16	10
250+ employees	0	45	43	0
All (9) Sectors (EU-5)				
% of employment	5	53	33	7
% of enterprises	8	78	6	6

Base: enterprises selling online. EU-5 = DE, ES, FR, IT, UK. N=102 for EU-5 sector total. Weighting: Figures for size-bands in % of enterprises. Reporting period: March/November 2003.

Source: *e-Business W@tch* (2003/04)

More than one half of all ICT service firms use online technologies (other than e-mail) to exchange documents with customers, compared to 23% on average (of all sectors covered by the *e-Business W@tch* survey). However, the integration of the IT system with that of a customer for receiving orders is the exception, even in this sector: only 6% of all ICT services companies do so.

From a regional point of view, companies in the Netherlands, Finland and Estonia are more intensive users of online technologies for interacting with customers.

Exhibit 2-29: Exchange of documents and standardised data with customers (2003)

	Use of online technologies* to exchange documents with customers	IT system is integrated with that of a customer for receiving orders
Sector total (EU-5)		
% of employment	58	13
% of enterprises	55	6
0-9 employees	54	6
10-49 employees	67	8
50-249 employees	56	8
250+ employees	59	18
All (9) Sectors (EU-5)		
% of employment	33	5
% of enterprises	23	3
DE Germany	67	23
ES Spain	67	21
FR France	54	1
IE Ireland	81	28
IT Italy	53	4
NL Netherlands	83	33
FI Finland	75	2
UK United Kingdom	57	16
CZ Czech Republic	21	6
EE Estonia	77	33
PL Poland	43	16
SI Slovenia	70	3

* other than free text e-mail. Base: all enterprises. EU-5 = DE, ES, FR, IT, UK. N=502 for EU-5 sector total and 50-100 per country. Weighting: Figures for size-bands in % of enterprises. Figures for countries are weighted by employment ("enterprises comprising …% of employees"). Reporting period: March/November 2003.

Source: *e-Business W@tch* (2003/04)

Customer relationship management

Another application to support marketing and sales processes electronically is CRM (Customer Relationship Management). In the ICT services sector, CRM systems are used to collect information about customer behaviour in a systematic manner, which in return helps companies to develop customised services and products, specifically adapted to the identified usage and demand patterns. CRM tools promise to improve mass customer service and cut administration costs, particularly for larger firms dealing with considerable numbers of mostly anonymous private customers.

Currently, 36% of employees in ICT services firms work in companies using a CRM system. This application is mainly used in large firms: 46% large companies have a CRM system in place but only 14% of micro and 28% of small enterprises do so.

Exhibit 2-30: Companies from the ICT Services using CRM (customer relationship management) software application (2003)

Base: all enterprises. EU-5 = DE, ES, FR, IT, UK. N=502 for EU-5 sector total.

Weighting: Figures for size-bands in % of enterprises. Figure for "Sector total" is weighted by employment ("enterprises comprising …% of employees"). Reporting period: March/November 2003.
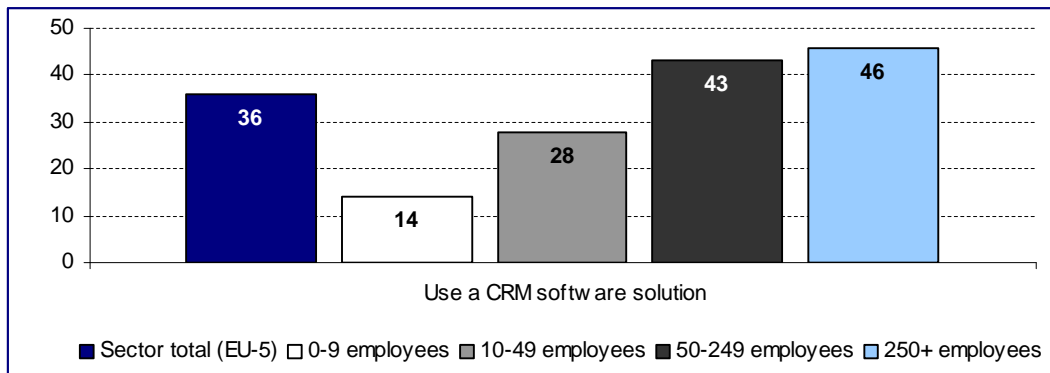
Source: *e-Business W@tch* (2003/04)

CRM applications are particularly important for large telecom operators, as they have to deal with a large number of customers from different market segments (consumer market, small office / home office market, business market). Moreover, the implementation of digital telecom networks in the 1990s enabled the development of new, additional services (for example simple forwarding of phone calls, calling line identification) and an increased flexibility for billing processes. These intelligent networks were the foundation for much of the customer-focused e-business activities in the telecommunication services industry.

Another factor driving the use of CRM systems in this sector is that they are used to plan and implement differentiation strategies. After the liberalisation of the market and the burst of the Internet bubble, telecom operators found themselves in a highly competitive market environment which was an entirely new experience for the incumbents among them. Many telecom services, and voice services in particular, are now becoming commodities. Operators have two main strategies to deal with this trend. One is to reduce costs wherever possible, the other is differentiation. The latter is accomplished by collecting a massive amount of customer data to segment and target specific groups in the market with special products, packages and tariffs. The Telenor business example shows how CRM and billing could become critical processes for telecom operators.

In the computing services sub-sector, the importance of CRM differs according to the various types of computer services. On one hand, CRM could be of crucial importance for software vendors involved in mass duplication of software and delivering to a large number of customers. Software vendors or resellers could provide access to software for clients from a central host site. On the other hand, CRM can be less important for system software providers which require customised design software to meet the needs of specific users. This is also the case for software consultancy suppliers who mainly have to deal with complex projects. For them, customer relationships need to be more personal and in many cases depend on face-to-face communication.

> ### *Business example:*
>
> ### *Customer self service portal at Telenor*
>
> *To stay ahead of the competition, Telenor, the Norway's leading telecom service operator, needed to get closer to its customers. Most of Norway's citizens use the Internet, so Telenor built a self-service portal, enabling customers to perform a multitude of personalized functions online, quickly and efficiently.*
>
> *Up to this point, Telenor had relied on call centres to handle inquiries such as customers' questions about invoicing and billing. As part of its customer relationship management strategy, the company needed to deliver a system that provided a better return on investment and improved relationships with residential customers. Telenor felt that an outstanding self-service channel would offer better service to the growing number of Web users. Major processes are now automated so customers can log on to the portal using a secure password and perform necessary functions. They can check their own payments or alternative payment strategies, invoice information, special offers, discounts and new products, personal usage details, changes in subscription services, order new services or e-mail Telenor with general inquiries.*
>
> *The self-service portal also enables Telenor to gather customer data and make more informed, business-critical decisions based on user information, needs and popular services. The company will not only retain its customers but also gain new ones, as those already benefiting from the portal recommend it to other customers or businesses.*
>
> *One of the innovative elements of the solution was the use of XML-based Web services and Simple Object Access Protocol (SOAP) to integrate Telenor's back-end systems and corporate middleware.*
>
> *Source :Telenor Annual report, 2002*

Perceived impact of online selling

Exhibit 2-31 Perceived effects of selling online on sales and business processes efficiency in the ICT Services (2003)
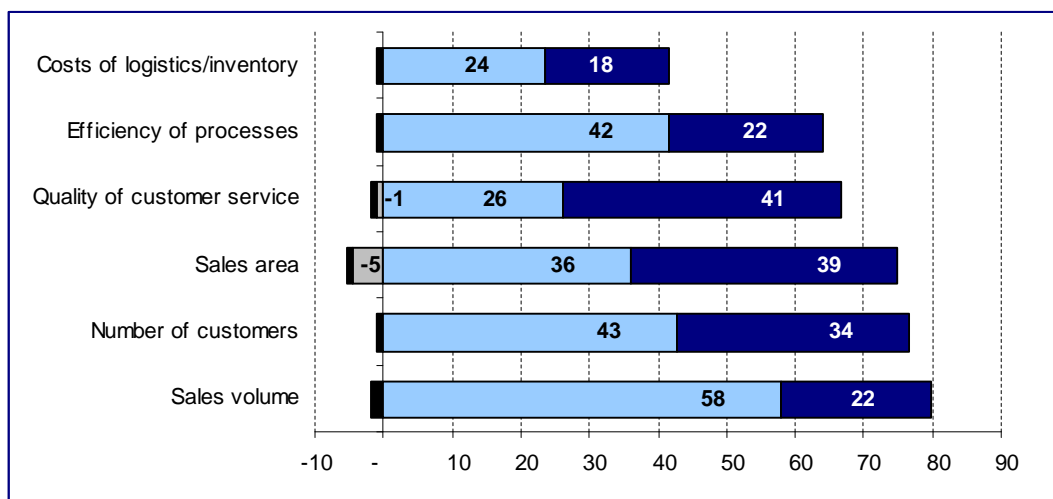
	very negative >>	fairly negative >>	fairly positive >>	very positive

Base: enterprises selling online. EU-5 = DE, ES, FR, IT, UK. N=102. In % of enterprises.
Reporting period: March/November 2003.

Source: *e-Business W@tch* (2003/04)

Exhibit 2-31 shows how companies assess the effects of their e-commerce activities. The majority of ICT services firms observe positive results. The main benefits of selling online are seen in improving direct commercial objectives: an increased sales volume, sales area and more customers. Impacts on the quality of customer services (80% fairly positive or very positive) are also evaluated as highly positive.

2.2.5   Functions of the extended enterprise

The main idea behind the concept of an "extended enterprise" is that a company – beyond its own salaries from assembly hall to management board - has also a network of business partners such as its suppliers, customers, distributors, and so on. The point is to exchange the right information with the right person at the right time, whether the person is an employee, a provider, a customer, or a reseller. In technologically advanced companies, the information system is completely integrated and govern every type of relationship, from SCM (supply chain management) to Knowledge Management applications to CRM (customer relationship management).

In the ICT services sector, the use of online technologies for business processes is important for both telecom operators and software developers. The former often collaborate closely with components manufacturers for designing and building telecom networks, while the latter favour the implementation of distributed project organisation involving internal employees as well as external business partners.

Exhibit 2-32: Use of online technologies (other than free text e-mail) for business processes between companies (2003)

	Collaborative product design	Collaborative demand forecast	Capacity / inventory management	Contract negotiation
Sector total (EU-5)				
% of employment	41	24	21	30
% of enterprises	31	16	12	30
0-9 employees	29	15	10	29
10-49 employees	47	23	31	34
50-249 employees	41	26	26	25
250+ employees	45	29	23	30
All (9) Sectors (EU-5)				
% of employment	17	12	14	13
% of enterprises	12	8	7	11
DE Germany	52	23	19	31
ES Spain	31	30	27	24
FR France	35	23	15	20
IE Ireland	48	37	40	17
IT Italy	41	26	30	23
NL Netherlands	44	14	14	21
FI Finland	40	41	27	58
UK United Kingdom	41	22	21	40
CZ Czech Republic	13	19	26	24
EE Estonia	37	26	22	75
PL Poland	32	26	13	39
SI Slovenia	49	32	15	25

Base: enterprises connected to the Internet. EU-5 = DE, ES, FR, IT, UK. N=492 for EU-5 sector total and 50-100 per country. Weighting: Figures for size-bands in % of enterprises. Figures for countries are weighted by employment ("enterprises comprising …% of employees"). Reporting period: March/November 2003.

Source: *e-Business W @tch* (2003/04)

Online technologies for collaborative product design are currently implemented in 31% of enterprises in the ICT sector in the EU-5. This figure is far above the all sector average (12%).

The use of online technologies for other purposes such as collaborative demand forecast (16%), capacity inventory management (12%) and contract negotiation (30%) is lower than collaborative product design in the ICT services sector, but still remains higher than in other sectors. In the telecom sector, for example, mobile operators often co-operate with resellers to forecast phone terminals demand. The use of online technologies to exchange documents, differs between size classes. Unstructured e-mail fits the needs of small companies, while large enterprises often need more structured ways of exchanging documents. That requires use of specific software to manage it.

In the second part of the e-Business Survey 2003, companies were asked if they exchange standardised data with buyers or sellers electronically. "Standardised data" was defined as electronic standard data exchanges such as orders, invoices, delivery notices and similar business documents but not plain e-mail messages. Data are not available for firms from all countries, but figures indicate the importance of XML based standards and proprietary standards in the sector.

Exhibit 2-33: Exchange of standardised data between companies (2003)

	Any standards	Type of standard				
		EDI based	XML based	STEP	Proprietary standards	Other
IE Ireland	48	20	38	17	42	2
NL Netherlands	75	39	58	3	51	18
FI Finland	78	28	53	9	28	23
CZ Czech Republic	63	22	36	0	10	8
EE Estonia	33	3	26	1	23	6
PL Poland	47	12	13	7	24	16
SI Slovenia	62	10	52	0	48	1

Base: all enterprises. EU-5 = DE, ES, FR, IT, UK. N=502 for EU-5 sector total and 50-100 per country. Weighting: Figures for size-bands in % of enterprises. Figures for countries are weighted by employment ("enterprises comprising …% of employees"). Reporting period: March/November 2003.

Source: *e-Business W @tch* (2003/04)

2.2.6   Outlook: What will be important

To conclude the statistical picture, this chapter features an outlook of what could become important applications with respect to e-business in the ICT services sector. Information is based on the assessment of firms. As this question was only included in the second part of the survey (in November 2003), data are available only for some countries.

According to companies in the sector, the development of Virtual Private Networks (VPN) might significantly influence the development of e-business in the years to come. Connecting securely the different sites of a company will encourage them to set online applications and will develop the use of online technologies in their business processes.

Also, the integration of IT components through web services is clearly regarded as an important development. More than half of the companies asked say it will be important. New XML based standards and mobile solutions to connect remote workers will also have an effect on the development of e-business (almost 50% of the companies asked think so).

It is safe to forecast that these developments are highly relevant as they will influence the future of e-business in the ICT services sector. The evolution of this sector has always been tightly linked to new technological progress and developments. Companies from Slovenia, Estonia and Ireland seem to be most sensitive for those evolutions.

Exhibit 2-34: Assessment by companies: The future importance of new developments

Mobile solutions to connect fieldworkers with company
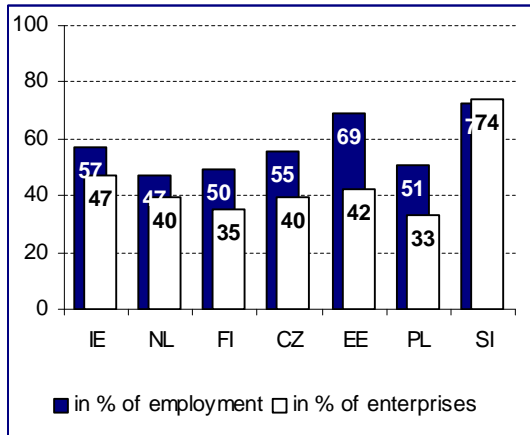
Integration of IT components through web services
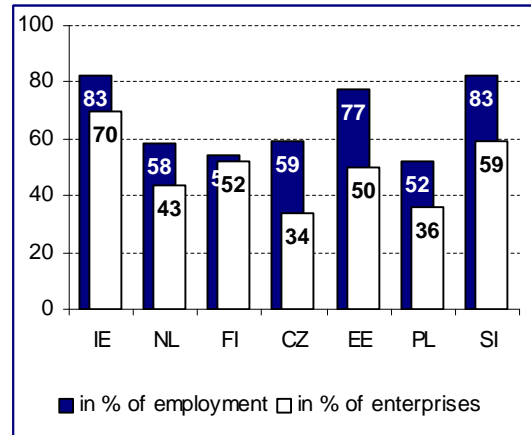
New XML based standards
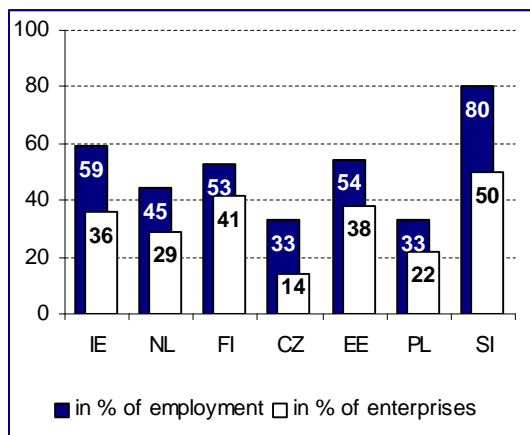
VPNs to connect companies securely via the Internet

% of companies saying this will be "important for their company" Base: all enterprises. N=50 to 100 per country. Reporting period: March/November 2003.

Source: *e-Business W @tch* (2003/04)

2.3   The European e-Business Sector Scoreboard

2.3.1   Introduction

This Scoreboard compares the importance of ICT and e-business applications in 9 sectors of the European economy using 16 key indicators. For reasons of consistency and comparability, all indicators are based on data obtained through the e-Business Survey 2003 of the *e-Business W@tch*. Normally, benchmarking activit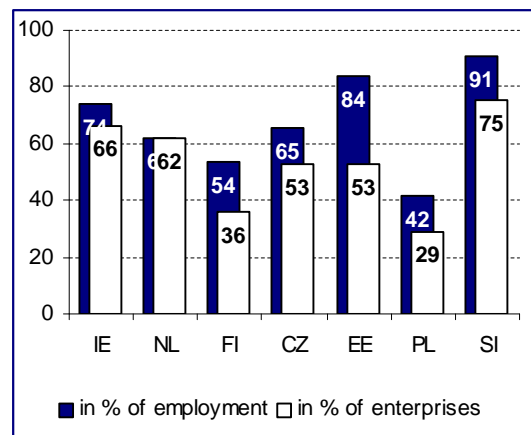ies of this type imply that a higher score stands for a better performance. In this context, however, the main objective of the Scoreboard is not to make a statement about sectors' e-business performance. The goal is rather to make visible at a glance the fundamental differences between sectors with respect to the role and the relative importance of information technology and electronic business applications. For instance, the Scoreboard for the tourism sector shows that e-business is very important for marketing and sales, while the e-business intensity is below the average in other business areas. For the chemical industries, the finding is just vice versa.

The indicators

The Scoreboard is composed of 16 component indicators for ICT and e-business, which are grouped into four categories according to the business functions they refer to. These categories are: (i) the connectivity of the enterprise, (ii) Internal business process automation, (iii) procurement and supply chain integration, and (iv) marketing and sales. The scoreboard compares the level of e-business across different sectors in each of these categories.

The selection and definition of component indicators was driven by pragmatic requirements, considering data availability (a selection criteria was that data were available for all sectors monitored and for the EU-5 countries) as well as data reliability (in the sense that only a minimum of indicators which reflect subjective perceptions of the interviewee were used). Some of the component indicators consist of more than one variable by themselves. Exhibit 2-35 on the next page explains all 16-component indicators and their definition.

The Scoreboard is flexible in terms of scope and choice of indicators. Additional categories could be added on demand. If component indicators are modified or exchanged, however, aggregate values for the respective category will obviously be affected.

Percentages and index values

The Scoreboard presents data both as percentages and as indexed values.

- **Percentages** express the share of employees from a sector that work in enterprises that use an application as defined in the following table.

- **Indexed values** take into account the percentages from all sectors and show how a specific sector differs from the all-sector-average. An index value is based on mean values and standard deviations. Constituting values are z-values, i.e. $z=(x - mean(x))/stddev(x)$. This procedure results in a distribution with $mean(z)=0$ and $stddev(z)=1$. Thus, index values express the multiple of the standard deviation (1 or (-1)) for a specific sector and the selected indicator. 0 equals the mean value for all sectors, a value of +1 that the percentage is higher than the mean percentage of all sectors by the extent of the standard deviation. Negative values show that the percentage is lower than the mean percentage of all sectors.

All spider diagrams are based on index values. The reason for preferring indexed values to simple percentages is that they adjust data for typical cross-sectoral gaps.

Exhibit 2-35: Definition of component indicators used for the E-Business Sector Scoreboard

A	Connectivity of the enterprise	
A.1	Enterprises connecting computers with a LAN	= the percentage of employees from a sector working in enterprises that have connected computers with a Local Area Network (LAN).
A.2	Internet connectivity	= the percentage of employees working in enterprises that are connected to the Internet, with a supplementary indicator for the type of Internet connection in terms of bandwidth. The percentage of employees working in enterprises that are connected with a bandwidth of less than 2 Mbps is computed with a factor of 0.5, enterprises connected with >= 2 Mbps bandwidth with a factor of 1.0. The maximum value of 100 would be returned if all employees from a sector work in enterprises connected to the Internet with >= 2 Mbps bandwidth.
A.3	Remote access to the company network	= the percentage of employees from a sector working in enterprises where it is possible to access data from the company's computer system from a remote location.
A.4	Wireless access to company network	= the percentage of employees from a sector working in enterprises where it is possible to access the company network through wireless technology, for example by means of a wireless LAN (W-LAN).
B	**Internal business process automation**	
B.1	Use of an intranet	= the percentage of employees working in enterprises that use an intranet.
B.2	Use of online technology to track working hours and/or production time	= the percentage of employees working in enterprises that use online technologies for production process controlling purposes by tracking working hours of employees and / or production times
B.3	Use of ERP systems	= the percentage of employees working in enterprises that have implemented an ERP (enterprise resource planning) system
B.4	Perceived impact of e-business on internal work processes	= the percentage of employees working in enterprises that say that the use of e-business applications has significantly or somewhat changed their internal work processes
C	**Procurement and supply chain integration**	
C.1	Enterprises purchasing at least 5% of their supplies online	= the percentage of employees working in enterprises saying that they purchase at least 5% of their supplies online via the Internet or other online networks (for example via EDI based connections to their suppliers)
C.2	Use of SCM systems	= the percentage of employees working in enterprises that use an SCM (supply chain management) system
C.3	Integration of the IT system with that of a supplier	= the percentage of employees working in enterprises that purchase some of their supplies online and have integrated their IT system with that of a supplier for this purpose
C.4	Electronic exchange of documents with suppliers	= the percentage of employees working in enterprises that exchange documents (other than plain text e-mails) electronically with their suppliers
D	**Marketing and sales**	
D.1	Enterprises maintaining a website with a content management system	= the percentage of employees working in enterprises that have a website and use a content management system to maintain and update the website
D.2	Use of CRM software systems	= the percentage of employees working in enterprises that use a CRM (customer relationship management) software to organise data about their customers electronically
D.3	Enterprises selling at least 5% of their goods & services online	= the percentage of employees working in enterprises saying that online sales via the Internet or other online networks (for example via an extranet) constitute at least 5% of their total sales volume
D.4	Enterprises with an online sales system offering the capability of secure transactions	= the percentage of employees working in enterprises that make online sales and whose online sales system offers the capability of secure transactions by means of a secure server, for example using SSL, TLS or a comparable technical standard

## 2.3.2 E-Business Scoreboards for the ICT services sector

Indexed scoreboard: component indicators

ICT services
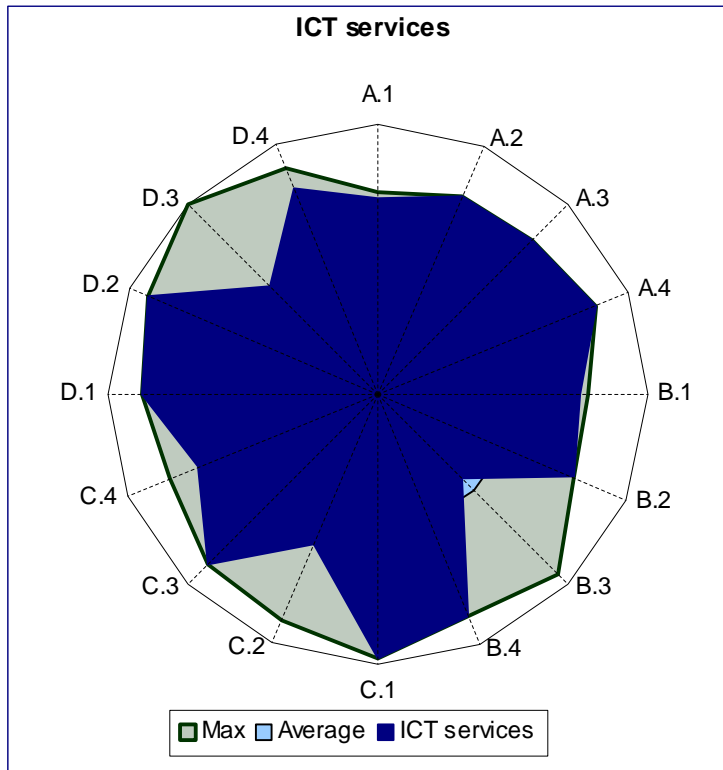
Indicators

A.1) LAN

A.2) Internet connectivity

A.3) Remote access to company network

A.4) Wireless access to company network

B.1) Use of an intranet

B.2) Use of online technology to track working hours and/or production time

B.3) Use of ERP systems

B.4) Perceived impact of e-business on internal work processes

C.1) Enterprises purchasing at least 5% of their supplies online

C.2) Use of SCM systems

C.3) Integration of IT system with supplier(s)

C.4) Electronic exchange of documents with suppliers

D.1) Enterprises maintaining a website with a content management system

D.2) Use of CRM software systems

D.3) Enterprises selling at least 5% of their goods & services online

D.4) Enterprises with an online sales system offering the capability of secure transactions

Indexed scoreboard: categories (aggregate)

ICT services
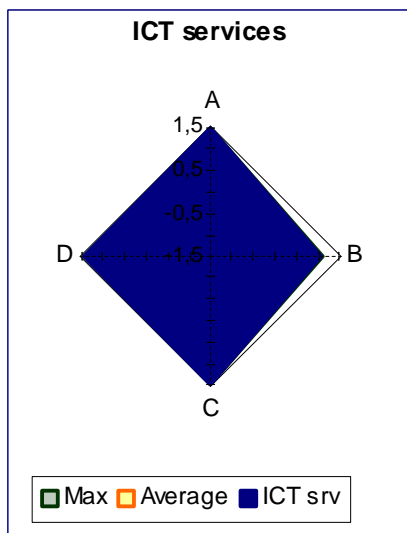
Categories

A) Connectivity of enterprises

B) Internal business process automation

C) Procurement and supply chain integration

D) Marketing and sales

Max = maximum indexed value for one of the 9 sectors

Average = mean value for the 9 sectors

Assessment: ICT services - the leading sector in using e-business

The ICT services sector is inclined to practise e-business, since the sector is not only a user, but also a key provider of IT related services. Thus the sector is very familiar with online technologies, and necessarily an early adopter in this matter. This applies to all business functions.

Employees in their every day work commonly use online tools and e-business as a strategic tool used to improve efficiency throughout the company and to enhance collaboration with the company partners.

2.3.3   Cross-sector Scoreboards

Scoreboard A) Connectivity of the enterprise

Indicator	A.1 LAN		A.2 Internet		A.3 Remote access		A.4 Wireless access	
Sector	%	Index	%	Index	%	Index	%	Index
Textile	50	-0.94	50	-0.99	26	-0.89	6	-0.88
Chemicals	83	0.82	63	0.31	57	0.63	12	0.01
Electronics	89	1.18	67	0.69	61	0.84	25	1.69
Transport equipment	88	1.13	71	1.10	70	1.25	9	-0.44
Retail	51	-0.91	51	-0.96	24	-1.03	9	-0.43
Tourism	49	-1.00	55	-0.49	28	-0.79	10	-0.36
ICT services	87	1.06	74	1.41	73	1.42	26	1.78
Business services	68	0.02	66	0.59	43	-0.08	12	-0.08
Health services	42	-1.36	43	-1.66	17	-1.35	3	-1.29
All sectors	**61**	**(-0.33)***	**58**	**(-0.26)***	**37**	**(-0.38)***	**11**	**(-0.25)***
Crafts & trade **	30	-1.68	42	-1.55	10	-1.50	3	-1.15

* Due to the larger number of firms and persons employed, service sectors have more weight in the "all sectors" percentage. In contrast, the mean percentage of nine sectors which is used to compute the index ed values, does not consider different sector sizes. Therefore, the indexed value of the percentage for "all sectors" is not zero.

** Figures for the crafts & trade sector were not included for computing the all-sector average and the indexed values for other sectors, because "crafts & trade" only include small enterprises. Values for crafts & trade result from a separate computation where this sector was included.

A. Connectivity (composite indexed values)
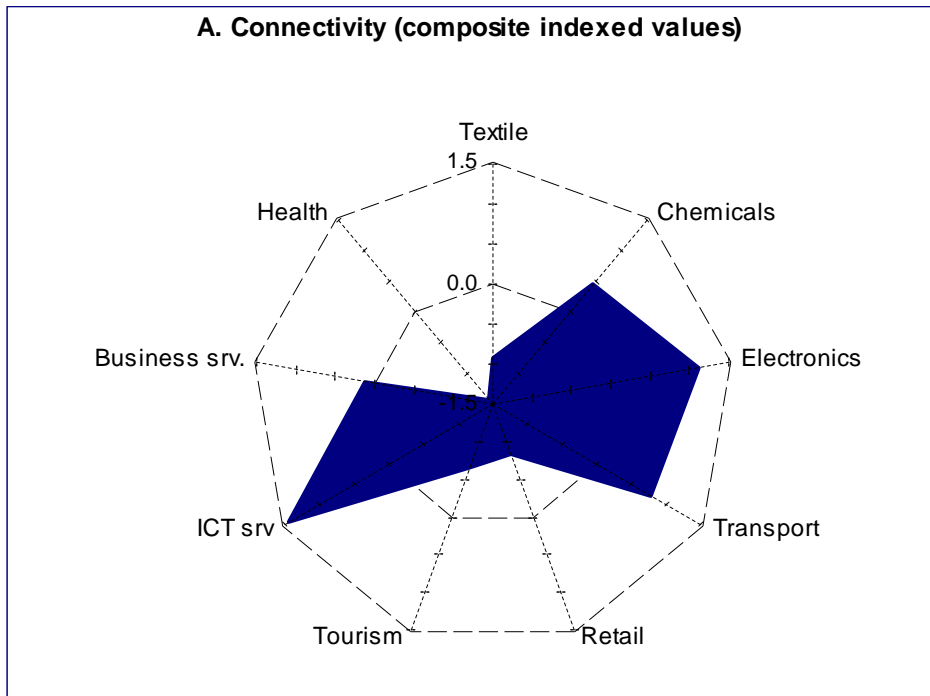
The connectivity scoreboard compares sectors with respect to the functionality of their IT networks. In general, companies from manufacturing sectors tend to be equipped with more powerful IT architectures than businesses from service sectors. The textile industries and the ICT services sector are the exceptions to this rule among the sample of sectors analysed by the *e-Business W@tch*. Results reflect the dominance of large enterprises with complex and sophisticated networking architectures in some manufacturing sectors (for instance in transport equipment manufacturing), compared to sectors such as business services, retail or tourism, where large players are less dominant. If only SMEs were considered, the connectivity gap would be much less pronounced.

Scoreboard B) Internal business process automation

Indicator	B.1 Intranet		B.2 Track production time		B.3 ERP use		B.4 Impact on work organisation	
Sector	%	Index	%	Index	%	Index	%	Index
Textile	32	-1.01	15	-0.74	18	-0.43	12	-1.39
Chemicals	62	0.47	33	0.60	48	0.96	16	-0.81
Electronics	77	1.18	36	0.85	45	0.84	25	0.47
Transport equipment	81	1.34	42	1.29	72	2.12	18	-0.51
Retail	37	-0.75	11	-1.06	13	-0.66	21	-0.13
Tourism	34	-0.91	10	-1.14	7	-0.96	26	0.57
ICT services	77	1.18	43	1.37	21	-0.28	34	1.80
Business services	49	-0.16	25	0.00	12	-0.71	29	1.09
Health services	25	-1.33	9	-1.18	9	-0.87	14	-1.08
All sectors	**45**	**(-0.35)***	**20**	**(-0.39)***	**19**	**(-0.40)***	**23**	**(0.11)***
Crafts & trade **	16	-1.48	8	-1.14	5	-0.95	11	-1.70

* Due to the larger number of firms and persons employed, service sectors have more weight in the "all sectors" percentage. In contrast, the mean percentage of nine sectors which is used to compute the index ed values, does not consider different sector sizes. Therefore, the indexed value of the percentage for "all sectors" is not zero.

** Figures for the crafts & trade sector were not included for computing the all-sector average and the indexed values for other sectors, because "crafts & trade" only include small enterprises. Values for crafts & trade result from a separate computation where this sector was included.
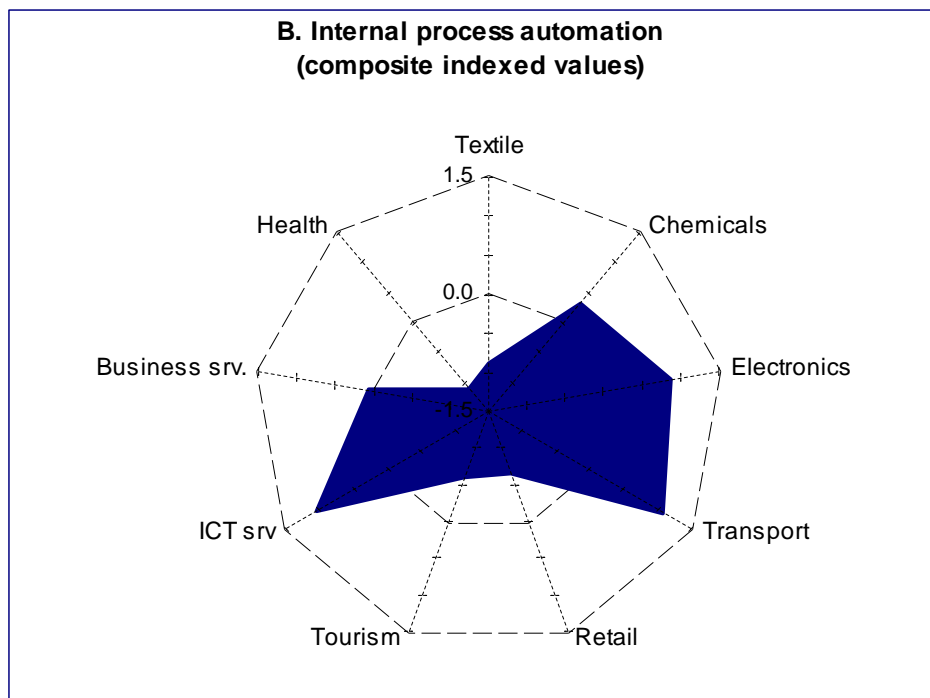

B. Internal process automation (composite indexed values)

This scoreboard indicates to what extent sectors use ICT to automate internal business processes. Results are largely in line with the connectivity scoreboard. Again, the scoreboard suggests that companies from manufacturing sectors where large enterprises are particularly dominant tend to be most advanced in linking and automating internal business processes. This could be expected considering that many internal e-business applications such as ERP systems are clearly more relevant for manufacturers and for large companies. However, service companies also use applications to link their internal processes, most of all the ICT services and the business services sectors.

Scoreboard C) Procurement and supply chain integration

Indicator	C.1 E-procurement intensity		C.2 SCM use		C.3 IT integration with suppliers		C.4 Online exchange with suppliers	
Sector	%	Index	%	Index	%	Index	%	Index
Textile	6	-1.56	7	-0.22	2	-1.31	31	-0.93
Chemicals	23	-0.23	13	0.91	6	-0.55	43	0.33
Electronics	30	0.34	10	0.36	12	0.62	45	0.56
Transport equipment	31	0.47	19	1.98	14	1.03	55	1.58
Retail	16	-0.81	5	-0.63	11	0.43	34	-0.59
Tourism	28	0.16	3	-1.05	7	-0.37	35	-0.49
ICT services	54	2.29	11	0.53	19	1.89	50	1.05
Business services	23	-0.18	6	-0.44	6	-0.62	43	0.34
Health services	20	-0.47	1	-1.44	3	-1.12	21	-1.85
All sectors	**23**	**(-0.18)***	**6**	**(-0.42)***	**8**	**(-0.19)***	**37**	**(-0.27)***
Crafts & trade **	10	-1.11	3	-0.97	6	-0.58	30	-0.86

* Due to the larger number of firms and persons employed, service sectors have more weight in the "all sectors" percentage. In contrast, the mean percentage of nine sectors which is used to compute the index ed values, does not consider different sector sizes. Therefore, the indexed value of the percentage for "all sectors" is not zero.

** Figures for the crafts & trade sector were not included for computing the all-sector average and the indexed values for other sectors, because "crafts & trade" only include small enterprises. Values for crafts & trade result from a separate computation where this sector was included.
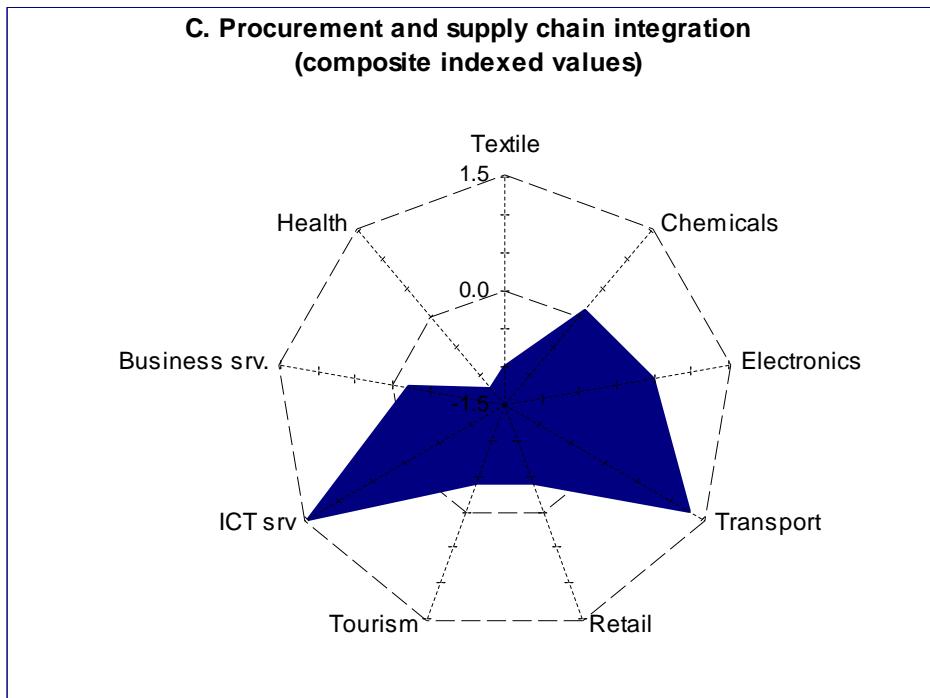

**C. Procurement and supply chain integration
(composite indexed values)**

This scoreboard compares sectors with respect to the intensity and sophistication of their e-procurement activities. Results suggest that two sectors are outstanding in this regard: the ICT services sector and the automotive industries. From the other sectors, only electronics and the chemical industries have indexed scores above average. The retail and the tourism sector are closer to the sector average (= 0 in the spider diagram) than in the scoreboards for their industry-wide connectivity and internal process automation. E-procurement activities in the textile industries seem to be at a surprisingly low level for a manufacturing sector where managing the supply chain is a core business function.

Scoreboard D) Marketing and sales

Indicator	D.1 Website with CMS		D.2 CRM use		D.3 E-commerce		D.4 Secure transaction capability	
Sector	%	Index	%	Index	%	Index	%	Index
Textile	7	-1.64	7	-1.05	1	-1.11	4	-1.24
Chemicals	17	-0.51	16	-0.01	2	-0.95	5	-0.83
Electronics	28	0.73	23	0.73	8	-0.11	8	-0.27
Transport equipment	23	0.13	26	0.98	13	0.63	8	-0.16
Retail	17	-0.53	7	-0.97	9	0.00	9	-0.04
Tourism	26	0.48	14	-0.28	24	2.36	18	1.92
ICT services	38	1.78	36	2.03	11	0.33	16	1.56
Business services	28	0.70	13	-0.35	6	-0.30	8	-0.25
Health services	12	-1.14	6	-1.07	3	-0.85	6	-0.70
All sectors	22	(-0.03)*	13	(-0.36)*	9	(0.03)*	9	(0.04)*
Crafts & trade **	6	-1.51	3	-1.24	1	-0.95	1	-1.50

* Due to the larger number of firms and persons employed, service sectors have more weight in the "all sectors" percentage. In contrast, the mean percentage of nine sectors which is used to compute the index ed values, does not consider different sector sizes. Therefore, the indexed value of the percentage for "all sectors" is not zero.

** Figures for the crafts & trade sector were not included for computing the all-sector average and the indexed values for other sectors, because "crafts & trade" only include small enterprises. Values for crafts & trade result from a separate computation where this sector was included.
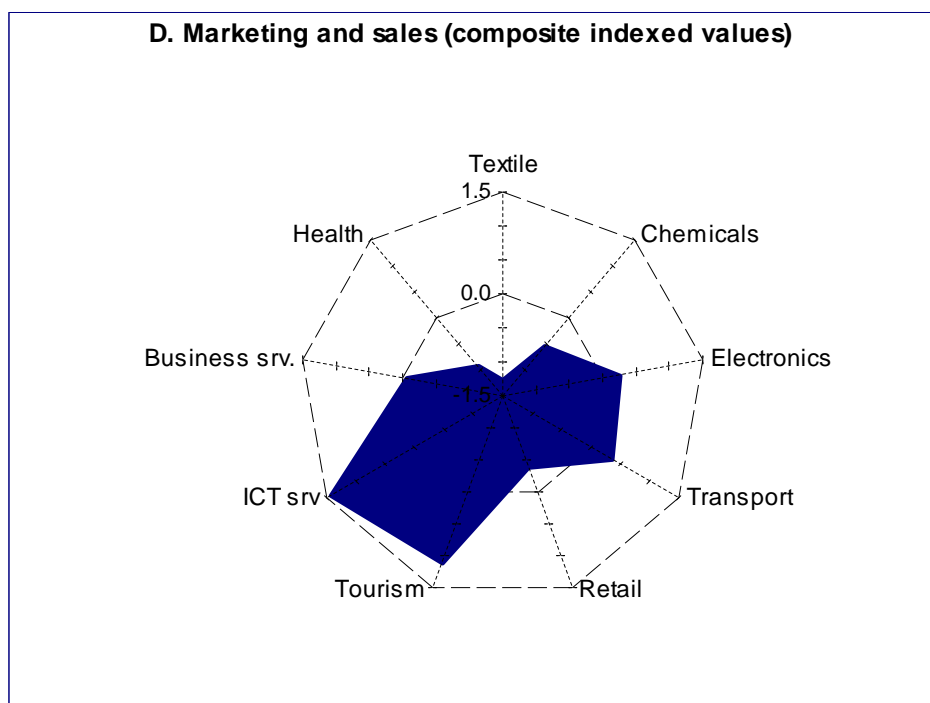

D. Marketing and sales (composite indexed values)

This scoreboard compares sectors with respect to e-marketing and e-sales activities. Results are quite different from the other scoreboards and show that using e-business for marketing and sales is a different story than, for instance, automating procurement and supply chain. Tourism, which is below average in all other sectors, is a leader and forerunner in the use of customer facing e-business applications. The sector is topped only by companies from ICT services, which manage a large amount of their customer relationship electronically. Retail also scores higher than in the other business areas, although still below average which is quite astonishing considering the e-commerce boom in specific retail markets (for instance books, software).

2.3.4   Sectors in profile
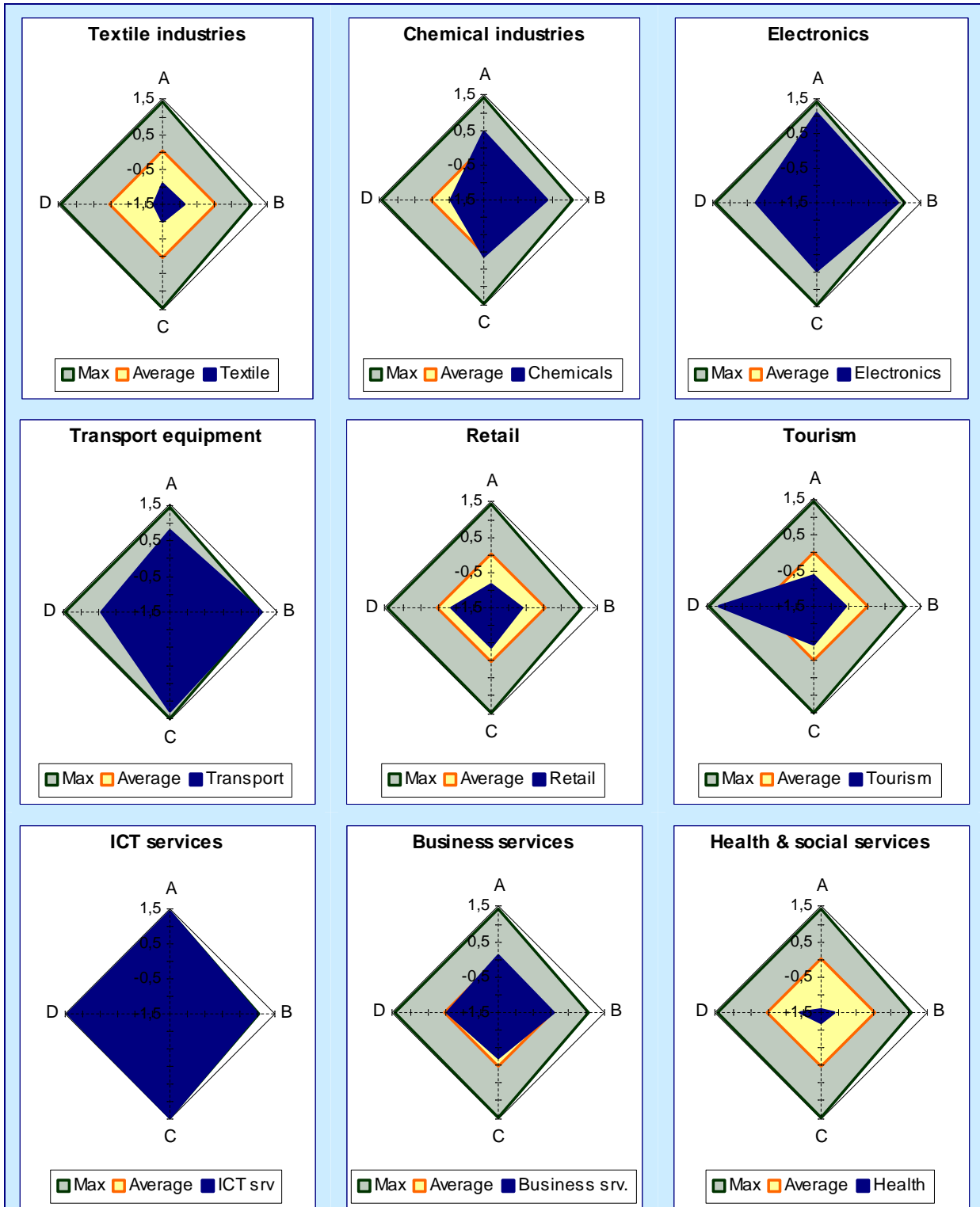
Indexed values by business functions (categories A-D). Each index is based on 4 key component indicators.
(A) = Connectivity of the enterprise; (B) = ICT use for internal business process automation
(C) = E-procurement and supply chain integration; (D) = E-marketing and sales
Max = Highest value in one of the 9 sectors benchmarked; Average = Mean value of all 9 sectors

3 Summary and conclusions

3.1 Summary of main findings

EU enlargement impacts

The enlargement of the European Union will not – at least initially – radically change the market of the European ICT services sector. The 10 new EU Member States will increase the European production value by only 1% in the telecom services sector and by only 1.8% in the computer services sector.

In the telecom services sector, telephony services and Internet access services will continue to be mainly local based services, depending on national telecom networks. Furthermore, Western European telecom services operators such KPN in the Czech Republic, Radiolinja and Tele2 in Estonia, Vodafone, Deutsche Telekom and Telenor in Hungary have already acquired stakes in the telecom incumbents. With increasing international business relationships and falling prices for international phone calls and data transfers, the Western telecom operators have already developed telecom services activities and partnerships in the Acceding Countries.

In the computer services sub-sector, the situation may be slightly different as more and more Western European computer service companies are looking for opportunities to reduce operational costs and to recruit skilled people. The EU enlargement could ease the recruiting of well educated and skilled workforce at lower labour costs. Software vendors, software integrators and data management services suppliers are interested in further developing their presence in the Acceding Countries. EU enlargement should facilitate this process and speed up outsourcing services such as data processing and standard software development from Western Europe to the Acceding Countries. However, this process could be redirected once labour costs in the Acceding Countries become too high as compared to some Asian countries for certain types of ICT services.

E-business in the ICT services sector

The results of the *e-Business W@tch* survey show that the ICT services sector stands well ahead of the other sectors monitored in terms of ICT equipment and adoption of e-business applications. Almost 82% of the respondents of the survey state that e-business constitutes a significant or some part of the way their company operates today, compared to 60% in the other sectors. The ICT services sector is an early adopter of e-business applications in every respect.

There are several reasons for the high e-readiness and maturity of the ICT services sector:

- First, this sector has the peculiarity of being both a supplier of the most essential elements for conducting e-business and a potential users of these elements.

- Second, the ICT services sector faces rapid technological changes that favour high IT adoption rates among its enterprises to stay competitive in the market.

- Finally, the ICT services sector relies more and more on project oriented work organisation which favours distributed production sites and generates large data workflows. Consequently, online technologies are crucial for ICT services enterprises to exchange and share information in such a networked business environment. More than half of all ICT companies use remote access to exchange information. All this contributes to growing demand for sophisticated data processing tools (ERP, CRM, SCM) to reduce operational cost and develop customised services, even if such systems have not yet reached a broad level of diffusion even in this ICT intensive sector.

Internal use of e-business

ICT services companies are better equipped with ICT infrastructure (LAN, WAN, remote access, Wireless LAN) than other sectors. Internet, e-mail and the Web are common tools used by a majority of office workers independent of firm size. On a higher level, automated internal business processes are more common in large companies, though, but this is common to all sectors.

ERP solutions are the exception to the general situation, as they are less deployed among ICT services firms than in some manufacturing sectors such as transport equipment, the chemical or the electronics sectors. But this is to be expected, as the computer services sector is dominated by SMEs and since companies work on project based services and not on manufacturing products.

E-learning applications are crucial to develop employees' skills in this sector. 17% of ICT services firms (employing one third of the sector employees) use e-learning applications compared to only 5% of companies in the all sector average. ICT services firms face the challenge of constantly keeping employees' competencies up-to-date in a context of rapid technological change and innovation.

Electronic commerce

The fraction of ICT services companies already purchasing goods or services online appears extraordinarily high (75%), compared to 31% on average in the 9 sectors monitored. Both sorts of inputs, MRO goods and direct production goods, are purchased online. To a certain extent, e-purchasing solutions play a crucial role in reducing production costs and enabling companies to stay competitive. The biggest perceived impacts of e-purchasing are the reduction of procurement costs and the improved efficiency of processes.

On the customer facing side (e-marketing and sales), ICT services companies make sophisticated use of their websites as a marketing and distribution platform. The web is an ideal communication and transaction channel for many firms from the sector, considering that telecom services operators and standard software vendors have to manage relationships with a large amount of customers. They can exploit the internet for managing customer billing processes electronically and for promoting software through offering trial versions, to give just a few examples.

Collaboration processes – the extended enterprise

The ICT services sector is also very advanced in using online technologies for co-operating with external business partners, especially with suppliers. 31% of enterprises of the sector collaborate online in designing products and 30% negotiate contracts online. These figures are considerably above the all sector average. Online collaboration facilitates the management of complex projects in this sector, often involving a large number of remote suppliers.

ICT and e-business in large and small companies

In general, the *e-Business W@tch* survey does not show great differences between SMEs and large companies in terms of ICT equipment and online technologies use. E-business constitutes a significant part of how companies operate for 75% of micro-enterprises (and for 85% of large firms).

The major differences between SMEs and large companies are to be found in the use of more complex systems, for instance in the diffusion of SCM and ERP systems. Furthermore, online selling activities and related processes also differ between large companies and SMEs. 30% of large companies sell online compared to only 15% for SMEs, and almost half of large companies that sell online have integrated orders with backend systems, while this is true for only 25% of micro and small firms. In smaller companies, incoming online orders often simply generate an automatic e-mail information.

SMEs show a high maturity regarding the use of e-business applications, but they have not yet developed the same sophisticated applications as larger firms. It is not so much the lack of competence that prevents them from doing so, but rather the high cost and the question whether this investment is actually justified (return on investment). In the medium and long run, however, the growing integration of the software production sector will drive the further inception of more formalised processes. E-business adoption will then be a key asset to remaining competitive on a global market.

Regional differences in adoption

The e-Business W@tch Survey indicates that basic Internet infrastructure is widely implemented among enterprises in Europe and no longer constitutes a major barrier to e-business adoption.

However, there are differences with respect to the availability of broadband Internet connections, remote and wireless access technologies. For example, in the Acceding Countries, the process of liberalisation of the telecom services market is not yet fully completed.

Beyond IT infrastructure deployment, the use of online technologies within ICT services companies varies to some extent by country. However, it must be considered in this context that the structure of the sector in each country (such as the average firm size) may have a significant impact on survey results.

As a general trend, companies from Germany, the Netherlands and Finland tend to be forerunners in the adoption of electronic business solutions. In the Acceding Countries, firms from Estonia and Slovenia show an astonishingly high level of e-business adoption, already ahead of many countries in the EU-15 of 2003.

3.2   Business implications

This chapter offers conclusions on the economic impacts of electronic business developments for individual enterprises and for the industry as a whole. The analysis of issues raised in this chapter will be consolidated and substantiated in the forthcoming second report (August 2004).

Impacts on enterprises

In the analysis of electronic business developments in the telecommunications and computer related services sectors, it must always be considered that the way how this sector implements e-strategies can have important implications not only for enterprises from the sector itself, but also for practically all other sectors. Firms from other sectors are users of ICT services and thus customers of this sector. Advances in e-business in ICT services are relevant for the interaction with customers. If these interactions can be more efficient, and if new services can be provided, it can have implications for other firms as well, depending on the importance of ICT in these sectors.

In the ICT services sector, electronic business is closely integrated into the daily operational processes of enterprises. 82% of the ICT services companies consider e-business to be a significant part of how they operate. Almost one third estimates this impact to be "very positive".

Exhibit 3-1: Overall significance of e-business for companies in 2003 (by region and by size-band)
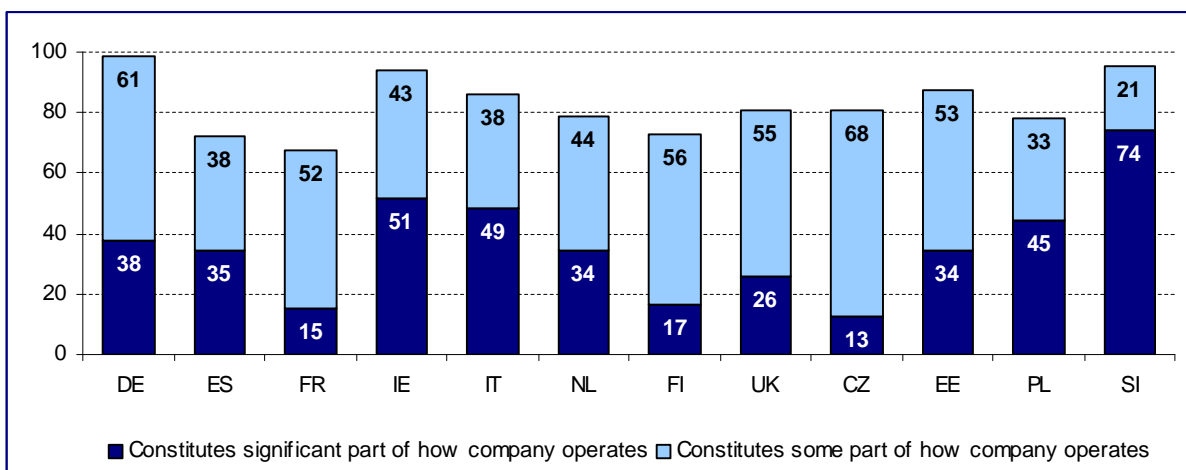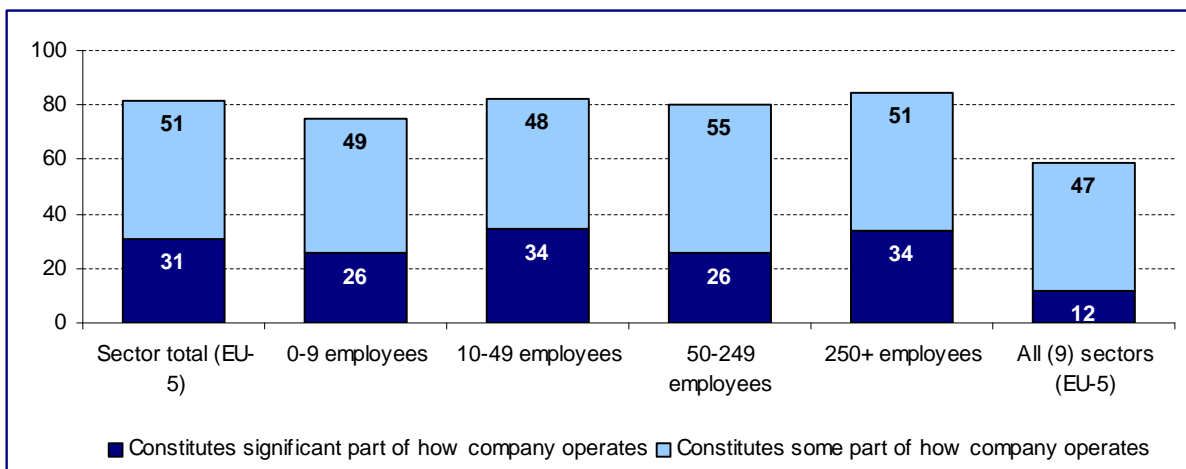
Base: all enterprises. EU-5 = DE, ES, FR, IT, UK. N=502 for EU-5 sector total and 50-100 per country.

Weighting: Figures for size-bands in % of enterprises. Figures for countries are weighted by employment ("enterprises comprising …% of employees"). Reporting period: March/November 2003.
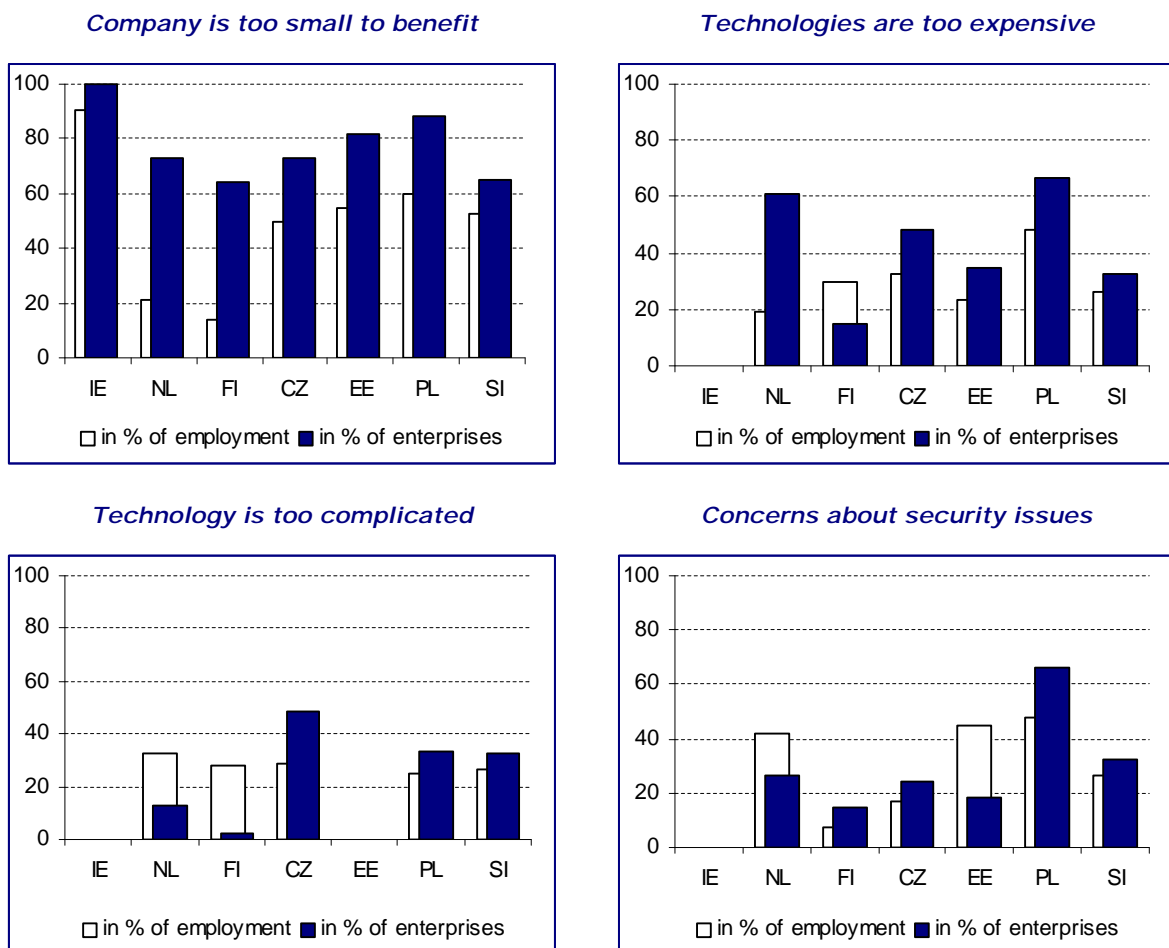
Source: *e-Business W@tch* (2003/04)

Limitation of e-business adoption

Despite the generally high diffusion and implementation of online technologies and e-business solutions among ICT services companies, there are still some impediments for an even wider deployment, particularly among small firms. The main barriers reported by companies not actively using e-business are that they consider themselves as "too small to benefit" from e-business activity. This finding must be treated with caution, though, as it is based on a small number of observations (due to the fact that the majority of firms actually engages in e-business and was excluded from this question). Furthermore, questions on the perceived impact of online selling and purchasing among companies which actually make transactions online indicate that in this sector in particular even small companies can improve the efficiency of their business processes and increase their sales volume through electronic commerce. Even among micro-enterprises of the sector, 74% make online purchases.

Other reasons quoted by non e-business users are that "technologies are too expensive" and concerns about security issues. But these possible barriers rank much lower than the size of the company. As can be expected, the complexity of technologies is not regarded as a problem in this sector whose core business is to deal with ICT.

Exhibit 3-2: Reasons why e-business does not play a role in companies


Base: enterprises not using e-business applications. N=6-23 per country (less than 20 in IE, CZ, EE, PL, SI).
Reporting period: March/November 2003.

Source: *e-Business W@tch* (2003/04)

Exhibit 3.3 summarizes the assessment of firms concerning the impact of their e-business activities on their own company. The perceived impacts are globally positive, in particular regarding collaboration and knowledge exchange between employees and the availability of information for management and controlling. Firms representing more than 80% of employment in the ICT services sector reported having observed positive impacts in these areas. Considering that the nature of a large part of the production processes in this sector is essentially project-based, this assessment should be expected. The effects of e-business regarding the internal processing of commercial transactions and product innovation are also positive, but to a lesser extent than for the other areas.

Exhibit 3-3: Perceived impacts of the Internet and e-business technologies

On collaboration and knowledge exchange between employees
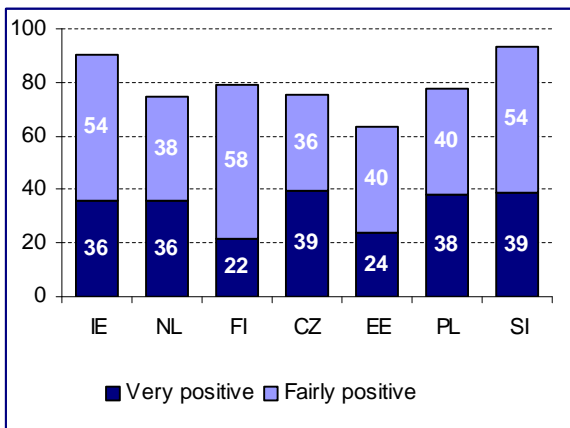
On availability of information for management and controlling
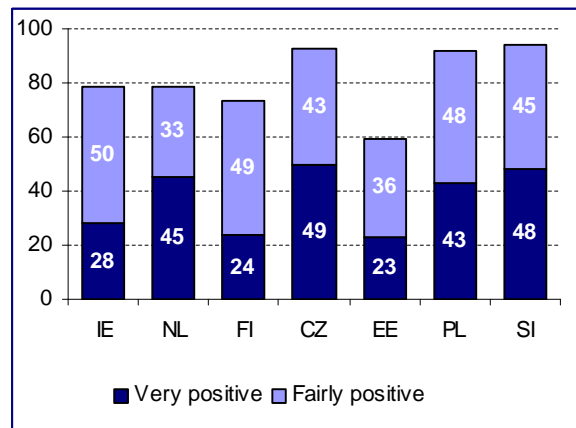
On internal processing of commercial transactions

On product innovation

Base: enterprises using the Internet. N=50-100 per country. Weighting: Figures is weighted by employment ("enterprises comprising …% of employees"). Reporting period: March/November 2003.

Source: *e-Business W@tch* (2003/04)

3.3   Policy implications

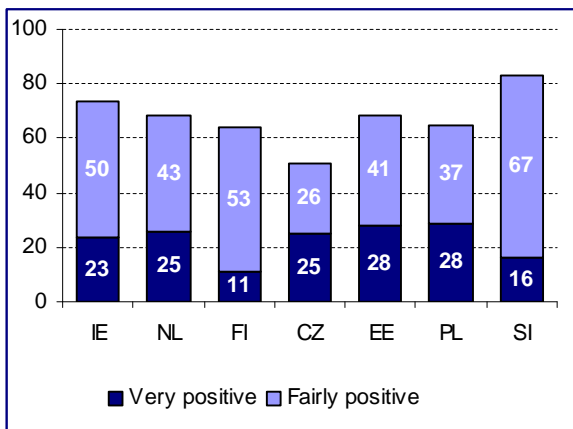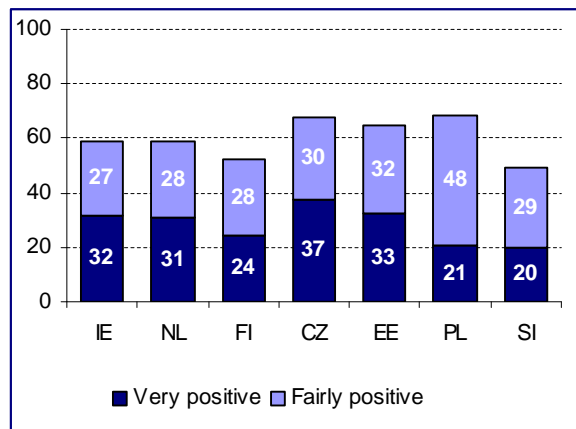The economic implications for individual enterprises in ICT services as well as those for the entire sector have some potential implications for policy. The *e-Business W@tch* proposes that policy could consider interventions such as support measures or co-ordinating activities with respect to the following issues and possible challenges.

High cost and a low level of customisation of e-business applications in the market constitute a main barrier of e-business adoption among SMEs

Critical e-business solutions still require high cost investments and are not always adapted to the specific requirements of small companies. Although the e-Business Survey 2003 confirms that the adoption of e-business has reached a high level in this sector even among SMEs, there are still important application areas where the enterprise size seems to constitute the single most important criteria for adoption or non-adoption. Out of those companies that do not consider e-business as relevant for their operations, 60-90% (depending on the country) consider themselves too small to benefit from e-business applications and 40-60% argue that e-business systems are too expensive for them to achieve an effective return on investment.

It can be argued that the concentration of the global market for e-business solutions, that is the dominant role of a few vendors, hinders the development of a broader offer that addresses more adequately the needs and requirements of small (and – to a lesser extent – medium-sized) firms, not even in the technologically savvy ICT services sector. Until recently, the big players, among them Oracle, People Soft and SAP), have primarily targeted large companies to sell expensive e-business suites and associated consulting services. The recent initiative of Microsoft to sell a light version of an e-business application (Navision) to SMEs may serve as an example, though, that there is a shift in the market towards smaller companies, as the large company market has become more mature.

In this context, it is an important objective that European SMEs should have access to standard and/or customised e-business solutions at reasonable prices. The growing horizontal integration of the ICT services industry and the emergence of new working methods in the computer related activities make the adoption of e-business solutions crucial for SMEs to stay competitive.

In consequence, we propose that the concentration of the European e-business applications market should be closely monitored by market regulators. Without prejudicing any decision or market development, the announcement of Oracle to acquire People Soft in 2004 can serve as an example of the concentration in the e-business software industry and the potential risks of this development.

Policy could consider measures to favour the emergence of new e-business solutions adapted to the small company market. A possible measure which could foster this development is to further promote "open" e-business standards. New standardisation policy and interoperable e-business systems should enable small software publishing companies to develop new products to enter niche markets and to compete successfully with incumbents.

In the framework of the EU enlargement, some investment support measures could also help small software editors seizing new partnership opportunities to build up an innovative offer of e-business solutions at reasonable prices targeted at SMEs.

The limited use of e-business applications among SMEs from the sector inhibits their participation in an international business environment and threatens their position in the (new) added value chain

Many SMEs are part of larger groups or make a significant percentage of their turnover from a small number of clients. This is notably the case when large companies have outsourced their IT department and created a new company to take over this task. In a rapidly changing technological environment, as it is the case in the ICT services sector, the integration of SMEs in a networked production infrastructure will be a critical factor to stay competitive and respond to the market demand.

In fact, buying patterns evolve rapidly. For example offshore outsourcing, Business Process Outsourcing (BPO), and on-demand computing are major innovative concepts that ICT services companies have developed to stay as close as possible to market concerns and needs. BPO, which means the takeover of an existing process by a services supplier, is predominantly transaction-based and is usually done because the supplier can manage the process more cheaply and efficiently than the user. This can be the case for payment processing (credit/debit cards, tolls, ATM), call centre operations or payroll management. Integration in a global production network remains vital for SMEs to deliver such new services. Although the technology is not the goal in itself, it can still be a significant factor of differentiation and success.

Furthermore, considering the objectives of cost reduction and customer acquisition, integrators or new players that provide global offers are more and more inclined to enter partnerships with telecom network manufacturers, network software developers, other software companies and computer manufacturers. The convergence of technologies will force telecom operators to increasingly offer integrated products and services. The organisational structure will change into layered structures consisting of horizontal integrated network, services and sales.

As the ICT services market is becoming global and production is shifting to a horizontal integration process, SMEs should be better equipped with integrated e-business applications for e-procurement, and even with SCM and ERP systems, to fully take advantage of new global business opportunities.

Against this context and challenge, the *e-Business W@tch* proposes to identify and develop case studies which describe how small ICT services companies have successfully been integrated in the strategic development of large companies, and how they have proceeded to change their production processes and developed new added value services.

Difficulties in recruiting IT skilled staff show the lack of new IT skills and hinder the potential development of a competitive European ICT services market.

As shown in the analysis, SMEs are facing difficulties in recruiting IT and e-business specialists. This puts SMEs at risk to not gain access to the level of expertise that they would need. Generally speaking, the difficulties in recruiting IT skilled staff in the ICT services sector may not only be related to the lack in the skills supply, but also to the evolution of IT business processes. The ICT services sector is composed of a myriad of firms providing services addressing sometimes very specific needs, which makes it difficult to develop standardised skills and training profiles.

A growing number of people are working as freelancers, and it can frequently be observed that there are various levels of sub-contracting to perform tasks within a contract signed with a single ICT service company. Therefore, assembling the necessary competences and managing them is an increasingly important issue. Large companies have ever more complex demands for ICT related management skills.

The lack of such specialised skills is a crucial issue in the ICT services sector, while a growing number of IT companies are engaged in offshore outsourcing, which raises the question to what extent European IT jobs are vulnerable to international competition. At the same time, however, the offshoring development is highly dependent on the export of ICT services. This requires strong demand from the importing countries and should imply a win-win situation. In this context, quality, IPR management, control and ROI are crucial.

In this context, policy is well advised to closely monitor and analyse the evolving patterns of demand and supply for ICT services and associated e-business skills. This goes clearly beyond the analysis which the *e-Business W@tch* can deliver in its sector studies about the use of e-business. It could be valuable, for example, to develop and propose common definitions and a methodological framework for the measurement and the forecast of demand and supply in the European Union. EITO has – in co-operation with IDC – provided a good basis for this work. In addition, policy could consider setting up and supporting a network of e-skills experts from relevant stakeholders for the further development and discussion of foresight scenarios in the field of e-skills.

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Annex I: Methodological Notes on the e-Business Survey 2003

Background

Most of the data presented in this report are results of a decision-maker survey about e-business in European enterprises in 2003. This is an annual survey carried out by the *e-Business W@tch* – the first one took place in 2002 –, constituting a cornerstones of its monitoring activities. For organisational and contractual reasons, the e-Business Survey 2003 was split into two parts. The first part consisted of 3,515 telephone interviews which were conducted in March 2003 with decision-makers in enterprises from five EU countries. The second part had a scope of 4,570 interviews in the EU, 100 interviews in Norway and 2,632 interviews in the 10 new EU Member States (NMS) and was conducted in November 2003. The questionnaires used in the two parts of the survey were largely the same. A few new questions were added in the second part in order to cover issues of special topical interest for policy.

Field work

The field work of the surveys in the EU-15 and in Norway was carried out by Ipsos Germany in co-operation with its partner organisations on behalf of the *e-Business W@tch*. Field work in the 10 new Member States was carried out by NFO Aisa (Czech Republic) and its network.

Country	Organisation	Country	Organisation
Belgium	INRA Belgium, Avenue de la Couronne 159-165, 1050 Brussels	UK	Continental Research, 132-140 Goswell Road, EC1V 7DY London
Denmark	Gallup TNS Denmark, Masnedogade 22-26, 2100 Copenhagen	Norway	Norfakta Markedsanalyse, Kjøpmannsgt. 5, 7013 Trondheim
Germany	INRA Deutschland GmbH, Papenkamp 2-6, 23879 Mölln	Cyprus	Synovate (member of the Aegis Group plc), Nicosia
Greece	Synovate, 24 Ippodamou St., 11635 Athens	Czech Republik	NFO AISA s.r.o., Slezská 113, 130 00 Praha 3, Česká republika
Spain	IPSOS ECO Consulting, Avda. de Burgos, 12-8a, 28036 Madrid	Estonia	Saar Poll, Veetorni 4, 10119 Tallinn, Estonia
France	Ipsos Insight Marketing, 99, rue de l'Abbé Groult, 75739 Paris Cedex 15	Hungary	MEDIAN, Opinion and Market Research, POB 551, BUDAPEST, H-1539
Ireland	TNS mrbi, Blackrock, Co. Dublin 2	Lithuania	BALTIC SURVEYS, 6A Šermukšnių str., Vilnius LT-2001, Lithuania
Italy	Ipsos-Explorer, Via Mauro Macchi 61, 20124 Milano	Latvia	TNS – baltic data house, Kronvalda Blvd. 3 – 2, Riga LV-1010, Latvia
Netherlands	INRA in Belgium, Avenue de la Couronne 159-165, 1050 Brussels	Malta	MISCO – Market Intelligence Services Co. Ltd., Valetta
Austria	Spectra Marktforschung: Brucknerstr. 3-5/4, 4020 Linz	Poland	CASE Consumer Attitudes & Social Enquiry, ul. Nowy Świat 64, PL 00-357 Warsaw
Portugal	Ipsos Portugal, Rua Joaquim António de Alguiar 43-5.°, 1070-15 Lisbon	Slovenia	CATI – Marketing, Media and Social Research & Consulting, Tržaška 2, 1000 Ljubljana
Finland	Taloustutkimus Oy, Lemuntie 9, 00510 Helsinki	Slovakia	NFO AISA s.r.o., Slezská 113, 130 00 Praha 3, Česká republika
Sweden	GfK Sverige, Box 401, 221 00 Lund		

Interview method

The fieldwork was carried out using mostly computer-aided telephone interview (CATI) technology. Face-to-face interviews were used in Lithuania, and a mixed approach in Malta. 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.

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 respective countries and which have their primary business activity in one of the sectors specified by NACE Rev. 1 categories (see table). The selection and composition of sectors took into account their economic importance and the relevance of e-business activities.

The most important viewpoints used 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 focus 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 drawn was a random sample of companies from the respective sector population in each country where the respective sector was to be surveyed with the objective of fulfilling strata with respect to company size class. Strata were to include a share of at least 10% of large companies (250+ employees) per country-sector cell, 30% of medium sized enterprises (50-249 employees) and 25% of small enterprises (10-49 employees). Micro enterprises with less than 10 employees were also included in the survey. Samples were drawn locally by field work organisations based on acknowledged business directories and databases (see table).

No.	| NACE Rev. 1		Sector Name
	Section	Division/Group	
01	D	17, 18, 19	Manufacture of textiles and textile products, leather and leather products
02	D	24, 25	Manufacture of chemicals and chemical products
03	D	30, 31 *(except 31.3 - 31.6),* 32	Manufacture of Electrical machinery and electronics
04	D	34, 35	Manufacture of transport equipment
05	D	Parts of (17-19), 20, (30-32), (34-35), 36, 45	Crafts And Trade: In addition to companies from sub-sections covered by other sectors: Manufacture of wood products; manufacture of furniture; construction and site preparation. Only enterprises with 0-49 employees.
06	G	52.11, 52.12, 52.4	Retail
07	H / I / O	55.1, 55.2, 62.1, 63.3, 92.33, 92.52, 92.53	Tourism
08	K	74	Business services
09	I / K	64.2, 72	Telecommunications and computer-related services
10	N	85.11, 85.12, 85.3	Health and social services

Population coverage of the e-Business Survey (2002) *(table title, spanning header)*

Country	Directory / Database	Country	Directory / Database
Austria	Herold BUSINESS MARKETING database	UK	Dun & Bradstreet
Belgium	Dun & Bradstreet	Norway	Dun & Bradstreet
Denmark	KOB (Købmandsstandens Oplysnings Bureau)	Cyprus	Census of economic activity
Germany	Heins und Partner Business Pool	Czech Republic	Merit – CDF, Meritum Software, Enterprises database 2003
Finland	Blue Book - TDC Hakernistot OY	Estonia	Estonian statistical bureau + Krediinfo (register of taxpayers)
France	IDATA, based on INSEE Siren file (the National Institute of Statistics) and other directories	Hungary	Company Information Data Store, provided by Hungarian Central Statistical office
Greece	ICAP directory (the major database for Greece)	Lithuania	Department of Statistics and National Register at Ministry of Economics
Ireland	Bill Moss	Latvia	Business Register of Republic of Latvia
Italy	Dun & Bradstreet	Malta	National Statistics Office, Employment and training corporation
Netherlands	Dun & Bradstreet	Poland	REGON (GUS) data (National register of business)
Portugal	MOPE database	Slovenia	IPIS directory, published by Noviforum (list of active Slovenian enterprises)
Spain	Dun & Bradstreet	Slovakia	Albertina, Albertina Data, Enterprises database 2003
Sweden	Swedish Post Adress Register (PAR)		

Scope of the e-Business Survey 2003: No. of interviews per country and sector

Scope	Part I (March 2003)	Part II (Nov/Dec 2003)
No. of sectors covered	7 sectors	10 sectors
No. of EU Member States involved	5 countries	25 countries
No. of sector-country-cells	35	98
No. of interviews	3515	4670 (EU+NO) + 2632 (NMS) = 7302

	Food, beverages and tobacco	Textile industries	Chemical industries	Electronics	Transport equipment	Crafts & trade (Construction ; Wood & furniture)	Retail	Tourism	ICT services	Health & social services	Business services	Total int.
Belgium			101				100				100	301
Denmark								67	67		66		200
Germany	100*	100	100*	100*	100*	100	100*	101*	100*	100	100	1101
Greece		84		76	89	75		75				399
Spain	100*	101	100*	100*	100*	108	100*	100*	100*	101	100	1110
France	100*	100	100*	100*	101*	101	101*	99*	100*	100	100	1102
Ireland		70						70	71			211
Italy	102*	100	101*	101*	100*	100	102*	102*	101*	100	101	1110
Luxembourg **												0
Netherlands		100							101	102		303
Austria				68				132		100		300
Portugal					104		100				100	304
Finland		75		75					76			226
Sweden			80	75	79						80	314
United Kingdom	100*	100	101*	101*	100*	100	101*	100*	101*	100	100	1104
Cyprus							64					64
Czech Republic			60		60			60	60	60		300
Estonia		50	50	50	21	65	50	50	50	50	50	486
Hungary				80	80						80	240
Lithuania								57				57
Latvia		51	49				51					151
Malta								51				51
Poland		80	80	80	80	80	80	80	80	80	80	800
Slovenia				56					51	53	55	58	273
Slovakia		50		50			50				60	210
Norway		30					70					100
TOTAL	**502**	**1021**	**992**	**1044**	**1082**	**729**	**1193**	**1138**	**993**	**1014**	**1109**	**10817**

* interviews carried out in March 2003   ** was covered in the e-Business Survey 2002

Problems encountered

No major problems were reported by the fieldwork organisations with respect to interviewing (e.g. comprehensibility of the questionnaire, logical structure). The overall feed-back from the survey organisations was that fieldwork ran smoothly and that they had the impression that the questionnaire was well understood by most respondents. Some difficulties occurred, though, mainly with respect to the following issues:

- The main challenge was the fulfilment of quotas regarding company size-bands. In many countries, it was not possible to accomplish the objective of including a minimum share of large or even medium-sized enterprises in specific sectors. In such a case, these were replaced by interviews with smaller companies or from other sectors.

- Another well known issue in this type of survey stems from the difficulties of conducting research projects among ICT decision-makers in general. 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 difficult to carry out interviews within businesses and retailers not using or with a very basic use of computers, because of the number of questions on related issues. The French field work

organisation, for instance, reported that the questionnaire was too specific for some organisations, for example for small companies in the health & social services sector. These are mostly doctor's surgeries, where it was felt that the e-business related questions were not applicable to them. Also, small companies from the crafts & trade sector, which often have just a computer but no network at all felt that the questionnaire was not sufficiently adapted to their activities.

- A related issue is that there are some compromises to be made if the same questionnaire should be used for micro-enterprises as well as for large companies. Some of the questions, while only scratching the surface of e-business activities in large companies, are hardly relevant for micro-enterprises with less than 10 employees. The Hungarian survey company, for instance, reported that some questions seemed to have little relevance for companies with only one or a few employees.

- Finally, an issue which was known in advance but is unavoidable in telephone interviews is that there is no "ideal target person" to be interviewed. Fieldwork organisations 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 and on the financial level. On the other hand, the general manager may not always be aware of the technical implementation status. The Irish field work organisation, for instance, reported that some of the smaller companies were not familiar with technical terms such as "EDI" or "EDIfact".

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 weighted by employment figures should be read as "enterprises comprising x% of employees". To give an example: The indicator "percentage of companies selling online" – if weighted by employment – is 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 where available information about higher industry aggregations, nearest neighbour data, turnover-employment correlation and secondary sources other than Eurostat. It also 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 online 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 was organised into the following modules:

- Background information (basic company data, innovation activities)

- ICT infrastructure and e-skills development in the company

- E-commerce and e-business activities (internal business process automation, procurement and supply chain integration, exchange of standardised data between trading partners, marketing and sales activities, use of e-business software)

- Impact of e-business (impact of selling and procuring online, perceived effects on work processes, satisfaction with outcome)

- Assessment of future importance of various e-business technologies

The choice of indicators considers relevant statistical work by the OECD and Eurostat and includes a basic set of widely accepted measures for e-commerce and e-business, but also tries to introduce 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 questionnaires can be downloaded (as a spreadsheet) from the *e-Business W@tch* website (www.ebusiness-watch.org).

Annex II: Glossary of Technical Terms

Term	Definition
Access	The ability to retrieve information and to communicate online through the use of digital information and communication technologies.
B2B	Business to Business. Electronic transactions between companies.
B2B e-marketplace	Electronic trading platforms on the Internet where companies can sell and/or buy goods or services to/from other companies. They can be operated by a single buyer or seller or by a third party. Many marketplaces are industry-specific. Some marketplaces require registration and membership fees from companies that want to conduct trade on them.
B2C	Business to Consumer. Electronic business processes between companies and consumers.
Bandwidth	The physical characteristic of a telecommunications system that indicates the speed at which information can be transferred. In analogue systems, it is measured in cycles per second (Hertz), and in digital systems in binary bits per second. (Bit/s).
Broadband	High bandwidth Internet access. In this report, broadband is defined as the capacity to transfer data at rates of 2Mbit/s (megabits per second) or greater.
Channel	In communications, a physical or logical path allowing the transmission of information; the path connecting a data source and a receiver.
CRM	Customer Relationship Management. Software systems that promise the ability to synthesize data on customers' behaviour and needs and thus to provide a universal view of the customer.
Dial-up	The process of establishing a temporary connection (to the Internet) via the switched telephone network.
DSL	Digital Subscriber Line. A family of technologies generically referred to as DSL, or xDSL, capable of transforming ordinary phone lines (also known as "twisted copper pairs") into high-speed digital lines, capable of supporting advanced services. ADSL (Asymmetric Digital Subscriber Line), HDSL (High data rate Digital Subscriber Line) and VDSL (Very high data rate Digital Subscriber Line) are all variants of xDSL
E-business	Electronic business. The *e-Business W@tch* uses the term "e-business" in the broad sense, relating both to external and to company internal processes. This includes external communication and transaction functions, but also ICT supported flows of information within the company, for example, between departments and subsidiaries.
E-commerce	Electronic commerce. As distinct from the broader concept of e-business, e-commerce refers to external transactions in goods and services between companies (B2B), between companies and consumers (B2C), or between companies and governments (B2G) and may therefore be seen as a subgroup or component of e-business activities.
EDI	Electronic Data Interchange. A way for unaffiliated companies to use networks to link their businesses by using a common technical standard for exchanging business data. While electronic mail between companies is common, electronic data interchange passes bigger bundles that replace large paper documents such as bills and contracts. Besides saving paper, computers could save time by taking over transactions such as regular purchase orders that now require human intervention.
E-readiness	Readiness for e-business is defined as the capability to engage in electronic transactions. This comprises appropriate network access (including sufficient bandwidth), internal hardware and software solutions as well as the procedural and managerial readiness to deal with online transactions from simple web presence through to fulfilment of customer orders and related after sales services.

ERP	Enterprise Resource Planning. A software system that helps to integrate and cover all major business activities within a company, including product planning, parts purchasing, inventory management, order tracking, human resources, projects management, and finance.
Extranet	A network using Internet protocols that allows external organisations (for example customers or suppliers) access to selected internal data. Essentially it is an Intranet which gives external users restricted access (often password protected) to information through the firewall.
ICT	Information and communication technology. ICT includes networks, computers, other data processing and transmitting equipment, and software. The application of ICT in business processes leads to e-business, if non-proprietary networks are used.
Information security	Measures taken to protect information systems against unauthorised use and attacks
Internet	The world's largest computer communication system, with an estimated 600 million users worldwide.[21] The Internet is a loose confederation of principally academic and research computer networks. It is not a network but rather the interconnection of thousands of separate networks using a common language.
Interoperability	The technical features of a group of interconnected systems (includes equipment owned and operated by the customer which is attached to the public telecommunication network) which ensure end-to-end provision of a given service in a consistent and predictable way.
Intranet	An internal Internet, that is an internal network running using TCP/IP, which makes information available within the company. Most intranets are connected to the Internet, and use firewalls to prevent unauthorised access.
ISDN	Integrated Services Digital Network. An international telecommunications standard for transmission of voice and data over dial-up lines running at 64 Kbit/s (kilobits per second). It allows sharing of multiple devices on a single line (for example, phone, computer, fax).
LAN	Local Area Network. The most common way of connecting computers in a small area (typically inside a building or organisation) for sharing databases and communication facilities. The two most common versions are Ethernet and Token Ring. Implementation is based on coaxial cables or plain wires. Speed achieved ranges from 10 Mbps to 100 Mbps.
Leased line	A private communication channel leased from the common carrier. It is usually a dedicated fixed-route link (e.g. point-to-point frame relay).
M-commerce	Mobile commerce. E-commerce that takes place using mobile connection devices and through data transmission via technical standards for mobile communication.
Micro enterprise	A company with less than 10 employees.
Modem	Modulator/Demodulator. A device that modulates outgoing digital signals from a computer or other digital device to analogue signals suitable to be transmitted through a conventional telephone line (copper twisted pair telephone). The reverse procedure takes place for incoming signals.
MRO goods	Maintenance, repair and operating goods. Supplies which companies need to maintain their operations, for example office supplies, in contrast to "direct production goods" which are components of the goods and services the company produces.
Processes	Business processes are operations that transform the state of an object or a person. This can, for example, be an order placed via the Internet. Ordering an object or a service creates a liability for the supplier to deliver, and initiates the transfer of property

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[21] cf. Nua Internet Surveys, How many online, June 2003
     (www.nua.com/surveys/how_many_online/index.html).

	rights from one entity to another. The electronic handling of processes is likely to speed them up and to introduce new processes in the realisation of the same transaction.
Remote access	The ability of a company computer network's transmission points to gain access to a computer at a different location.
SCM	Supply Chain Management. Software that helps businesses to match supply and demand through integrated and collaborative planning tools.
Sector	Sectors of the economy with comparable business activities. These constitute the main research unit of the *e-Business W@tch*. Aggregated information at the industry level is used to document the diffusion of activities within the industries as well as the overall importance of the observed phenomena for changes in the economy as a whole. The definition of sectors follows NACE Rev.1 classifications.
SME	Small and medium-sized enterprises with 0-249 employees. To be classed as an SME, an enterprise has to satisfy the criteria for the number of employees and one of the two financial criteria, i.e. either the turnover total or the balance sheet total. In addition, it must be independent, which means less than 25% owned by one enterprise (or jointly by several enterprises) falling outside the definition of an SME or a micro-enterprise, whichever may apply. The thresholds for the turnover and the balance sheet total will be adjusted regularly, to take account of changing economic circumstances in Europe.
Transaction	Electronic transactions can be subdivided into several steps, each of which initiates a process. There are pre-sale (or -purchase) phases, sale and after-sale phases. Typically a transaction starts with information gathering, price and quality comparisons and possibly pre-sale negotiations. During the sale phase contracting and delivery are the core processes, and payment is the final stage of this phase. After-purchase transaction stages comprise customer service, the administration of credit payments and the handling of returns as well as marketing activities preparing for the next purchase.
Value added	Gross output minus intermediate inputs. It is valued at producers' prices and includes all indirect taxes but excludes VAT and subsidies.
WAN	Wide Area Network. A network allowing the interconnection and intercommunication of a group of computers over a long distance.
WAP	Wireless Application Protocol. A communication protocol for delivering data over mobile telephone systems, allowing cellular phone sets and other mobile hand-set systems to access WWW pages and other wireless services.
Website	A related collection of World Wide Web files that includes a beginning file called a home page.
Wi-Fi	Short for "wireless fidelity", popular term for a high-frequency wireless local area network (W-LAN). Wi-Fi technology is rapidly gaining acceptance as an alternative or complementary infrastructure to a wired LAN.
W-LAN	Wireless Local Area Network. An implementation of a LAN with no physical wires, using wireless transmitters and receivers. It allows a mobile user to connect to a LAN or WAN through a wireless (radio) connection. A standard, IEEE 802.11, specifies the technologies for wireless LANs.
WWW	World Wide Web. The collection of pages in html format which reside on web-servers. Although WWW and the Internet are different, the terms are increasingly becoming interchangeably used.

Annex III: Sector Impact Studies
of the *e-Business W@tch* in 2003/04

No.	Sector	Date
1	Textile, clothing and footwear industries	
	• Report I: The Quantitative Picture: Diffusion of ICT and e-business in Europe	May 2004
	• Report II: Assessment and Case Studies: Economic implications and policy recommendations.	August 2004
2	Chemical industries	
	• Report I: The Quantitative Picture: Diffusion of ICT and e-business in Europe	May 2004
	• Report II: Assessment and Case Studies: Economic implications and policy recommendations.	August 2004
3	Electrical machinery and electronics	
	• Report I: The Quantitative Picture: Diffusion of ICT and e-business in Europe	May 2004
	• Report II: Assessment and Case Studies: Economic implications and policy recommendations.	August 2004
4	Transport equipment manufacturing	
	• Report I: The Quantitative Picture: Diffusion of ICT and e-business in Europe	May 2004
	• Report II: Assessment and Case Studies: Economic implications and policy recommendations.	August 2004
5	Crafts' and trade sectors	
	• Report I: The Quantitative Picture: Diffusion of ICT and e-business in Europe	May 2004
	• Report II: Assessment and Case Studies: Economic implications and policy recommendations.	August 2004
6	Retail	
	• Report I: The Quantitative Picture: Diffusion of ICT and e-business in Europe	May 2004
	• Report II: Assessment and Case Studies: Economic implications and policy recommendations.	August 2004
7	Tourism	
	• Report I: The Quantitative Picture: Diffusion of ICT and e-business in Europe	May 2004
	• Report II: Assessment and Case Studies: Economic implications and policy recommendations.	August 2004
8	ICT services	
	• Report I: The Quantitative Picture: Diffusion of ICT and e-business in Europe	May 2004
	• Report II: Assessment and Case Studies: Economic implications and policy recommendations.	August 2004
9	Business services	
	• Report I: The Quantitative Picture: Diffusion of ICT and e-business in Europe	May 2004
	• Report II: Assessment and Case Studies: Economic implications and policy recommendations.	August 2004
10	Health and social services	
	• Report I: The Quantitative Picture: Diffusion of ICT and e-business in Europe	May 2004
	• Report II: Assessment and Case Studies: Economic implications and policy recommendations.	August 2004