

Annex I: The e-Business Survey 2006 – Methodology Report

Background and scope

e-Business W@tch collects data relating to the use of ICT and e-business in European enterprises by means of representative surveys. The e-Business Survey 2006, which was the fourth survey after those of 2002, 2003 and 2005, had a scope of 14,065 telephone interviews with decision-makers in enterprises from 29 countries, including the 25 EU Member States, EEA and Acceding / Candidate Countries.¹ Interviews were carried out in March and April 2006, using computer-aided telephone interview (CATI) technology.

Questionnaire

The questionnaire is similar to those used in the previous surveys from 2002 to 2005 in order to ensure a basic continuity of the research approach. The module on ICT impact was substantially extended compared to 2005, in response to current policy interest, in exchange for some questions from other modules.

Some questions which were also used in previous surveys were slightly modified. The most important change in this context concerns questions on e-commerce: up to 2005, companies were asked whether they "purchase / sell online"; in 2006, companies were asked whether they "place / accept orders online". This is a more precise question, since the terms "purchasing" and "selling" leave it open whether ordered goods also have to be paid online in order to qualify for "online purchasing / selling".

Some specific topics were added or expanded in the questionnaire in order to reflect the latest e-business developments; examples are the new questions on the use of RFID and Voice-over-IP.

The questionnaires of all four surveys (2002, 2003, 2005, 2006) can be downloaded from the *e-Business W@tch* website (www.ebusiness-watch.org/about/methodology.htm).

Population

As in 2005, the survey considered only **companies that used computers**. Thus, the highest level of the population was the set of all computer-using enterprises which were active within the national territory of one of the 29 countries covered, and which had their primary business activity in one of the 10 sectors specified on the basis of NACE Rev. 1.1.

Evidence from previous surveys shows that computer use can be expected to be 99% or more in all sectors among medium-sized and large firms. Differences are more relevant, however, for micro and small enterprises, in particular in the food and beverages industry, the textile and footwear industries, construction and tourism. In these four sectors, 10-30% of micro enterprises and 4-15% of small firms (depending on the country and sector) do not use a computer.² This should be considered when comparing figures over the years, as figures either represent a percentage of "all companies" (as in 2002 and 2003)

¹ The EEA (European Economic Area) includes, in addition to EU Member States, Iceland, Liechtenstein and Norway. Acceding Countries with whom an Accession Treaty has been signed are Bulgaria and Romania; Candidate Countries, which are candidates for accession into the EU, are (as of September 2006) Croatia, the former Yugoslav Republic of Macedonia, and Turkey. In most of these countries, interviews and/or case studies were conducted.

² Non-computer users include typically small craft firms (textile, construction), bars, restaurants or pensions (in tourism), and small food producing companies.

or a percentage of "companies using computers" (as in 2005 and 2006). Differences are minimal, though, when figures have been weighted by employment.

The 10 sectors which were selected for the 2006 survey are extremely heterogeneous in terms of their size. Construction and tourism are by far the largest with about 1.5 million enterprises in each of the EU-25.³ At the other end of the range is the consumer electronics industry with about 5,400 enterprises; this is a factor of about 280 between the largest and smallest sector. This imbalance has inevitably a substantial impact on weighting and thus on aggregate results, which are dominated by figures from construction and tourism.

Table 1: Population coverage of the e-Business Survey 2006

No.	NACE Rev. 1.1	Sectors covered	No. of enterprises in EU-25 *	No. of interviews conducted
1	DA 15 (most groups)	Food and beverages	282,000	1,701
2	DC 19.3	Footwear	13,700	978
3	DE 21	Pulp, paper and paper products	18,400	1,158
4	DL 30, 32.1+2	ICT manufacturing	31,800	1,687
5	DL 32.3	Consumer electronics	5,400	665
6	DM 35.11	Shipbuilding and repair	7,200	143
7	F 45.2+3 (selected classes)	Construction	1,546,000	2,654
8	H 55.1/3, I 63.3, O 92.33/52	Tourism	1,500,000	2,665
9	I 64.2	Telecommunication services	12,900	1,580
10	N 85.11	Hospital activities	(e) 13,000	834

* mostly based on Eurostat SBS, latest available figures

(e) = estimated on the basis of figures for the former EU-15 (no figures available for EU-25)

Sampling frame and method

No cut-off was made in terms of minimum size of firms. The sample drawn was a random sample of companies from the respective sector population in each of the countries, with the objective of fulfilling minimum strata with respect to company size class per country-sector cell. Strata were to include a 10% share of large companies (250+ employees), 30% of medium sized enterprises (50-249 employees), 25% of small enterprises (10-49 employees) and up to 35% of micro enterprises with less than 10 employees.

Samples were drawn locally by fieldwork organisations based on official statistical records and widely recognised business directories such as Dun & Bradstreet or Heins und Partner Business Pool (both used in several countries).

The survey was carried out as an enterprise survey: data collection and reporting focus on the enterprise, defined as a business organisation (legal unit) with one or more establishments.

Due to the rather small population of enterprises in some of the sectors, target quota, particularly in the larger enterprise size-bands, could not be accomplished in each of the countries. In these cases, interviews were shifted to the next largest size-band (from large to medium-sized, from medium-sized to small), or to other sectors.

³ Construction (NACE Rev. 1.1 F 45) in total has about 2.3 million enterprises. The sub-sectors covered in 2006 (see Table 1) account for about 1.5 million out of these.

Fieldwork

Fieldwork was coordinated by the German branch of Ipsos GmbH (www.ipsos.de) and conducted in cooperation with its local partner organisations (see Table 2) on behalf of e-Business W@tch.⁴

The survey had a scope of 14,081 interviews, spread across the 29 countries and 10 industries covered. In 10 countries ("EU-10"), all 10 sectors were covered; in the other countries, selected industries were surveyed. In most countries, between 400 and 750 interviews were conducted. Pilot interviews prior to the regular fieldwork were conducted with 23 companies in Germany in February 2006, in order to test the questionnaire (structure, comprehensibility of questions).

Table 2: Institutes that conducted the fieldwork of the e-Business Survey 2006 and no. of interviews per country (#)

	Institute	# Int.		Institute	# Int.
BE	Ipsos Belgium, 1050 Brussels	400	MT	Misco International Ltd., Valetta VLT 04	101
CZ	Ipsos Czech Republic, Skolska 32/694, 110 00 Praha 1	750	NL	Ipsos Belgium, 1050 Brussels	400
DK	Vilstrup Research AS, 1360 Copenhagen	403	AT	Spectra Marktforschungs-gesellschaft m.b.H., 4020 Linz	400
DE	Ipsos GmbH, 23879 Mölln	800	PL	Ipsos Poland, 02-508 Warszawa	752
EE	Marketing and Public Opinion Research Centre SKDS, Riga LV-1010	314	PT	Ipsos Portugal, 1070-15 Lisbon	400
EL	Synovate Hellas, 15451 Athens	407	SI	GfK Gral-Iteo trazne raziskave d.o.o., 1000 Ljubljana	400
ES	Ipsos Eco Consulting, 28036 Madrid	754	SK	GfK Slovakia Ltd., 813 41 Bratislava 1	400
FR	Ipsos France, 75739 Paris	751	FI	Taloustutkimus Oy, 00510 Helsinki	752
IE	Landsdowne Market Research, Dublin 1	400	SE	GfK Sverige AB, 22100 Lund	400
IT	Demoskopea S.p.A., 00199 Roma	756	UK	Continental Research, London EC1V 7DY	750
CY	Synovate Cyprus, 2107 Nicosia	209		EEA and Acceding/Candidate countries	
LV	Marketing and Public Opinion Research Centre SKDS, Riga LV-1010	432	NO	Norstat Norway, 0159 Oslo	401
LT		404	BG	TNS BBSS Gallup Interbational, 1164 Sofia	400
LU	Ipsos GmbH, 23879 Mölln/20097 Hamburg	117	RO	Field Insights, Bucharest 2	440
HU	Szonda Ipsos, 1096 Budapest	772	TR	Bilesim International Research & Consultancy Inc. Turkey, 34676 Istanbul	400

⁴ The survey was carried out under two different contracts. The survey in the six largest EU countries (DE, ES, FR, IT, PL, UK) was carried out as part of the e-Business W@tch contract between the European Commission and empirica GmbH; the survey in the other countries was carried out in parallel, but under a different contract (following an open call for tender for the "extended e-Business W@tch survey", issued in 2005).

Non response: In a voluntary telephone survey, in order to achieve the targeted interview totals, it is always necessary to contact more companies than just the number equal to the target. In addition to refusals, or eligible respondents being unavailable, any sample contains a proportion of "wrong" businesses (e.g., from another sector), and wrong and/or unobtainable telephone numbers. Table 3 shows the completion rate by country (completed interviews as percentage of contacts made) and reasons for non-completion of interviews. Higher refusal rates in some countries, sectors or size bands (especially among large businesses) inevitably raises questions about a possible refusal bias. That is, the possibility that respondents differ in their characteristics from those that refuse to participate. However, this effect cannot be avoided in any voluntary survey (be it telephone- or paper-based).

Table 3: Interview contact protocols: completion rates and non-response reasons (2006, examples)

		CZ	DE	ES	FR	HU	IT	NL	PL	FI	UK
1	Sample (gross)	5595	7763	7730	8686	21540	8533	4576	11054	3016	11821
1.1	Telephone number does not exist	283	1055	0	186	5545	717	349	2282	139	2663
1.2	Not a company (e.g. private household)	79	80	356	66	2076	89	219	681	34	324
1.3	Fax machine / modem	56	48	0	79	1120	61	28	53	4	130
1.4	Quota completed -> address not used	43	124	660	1939	1665	2154	1002	877	66	158
1.5	No target person in company	17	359	730	142	9	178	232	959	319	736
1.6	Language problems	9	18	0	25	0	1	36	0	41	20
1.7	No answer on no. of employees	2	1	10	13	6	8	1	19	1	0
1.8	Company does not use computers	48	47	158	250	279	314	235	460	28	51
1.9	Company does not qualify	134	330	103	156	0	113	47	813	49	215
	Sum 1.1 – 1.9	671	2062	2017	2856	10700	3635	2149	6144	681	4297
2	Sample (net)	4924	5701	5713	5830	10840	4898	2427	4910	2335	7524
2.1	Nobody picks up phone	1071	582	1645	6	1023	647	82	513	22	1898
2.2	Line busy, engaged	83	122	57	46	89	0	3	73	1	1
2.3	Answering machine	143	145	121	1315	1200	0	9	127	1	145
2.4	Contact person refuses	2080	1125	2553	131	2011	729	1653	2009	578	2523
2.5	Target person refuses	450	1865	202	1475	2776	642	113	280	405	1618
2.6	No appointment during fieldwork period	3	11	70	182	2571	384	112	150	50	376
2.7	Open appointment	295	953	35	1896	258	1041	21	763	459	51
2.8	Target person is ill / unavailable	2	31	0	0	0	13	0	29	2	32
2.9	Interview abandoned	43	67	271	29	108	686	34	176	15	130
2.10	Interview error, cannot be used	4	0	5	5	32	0	0	38	50	0
	Sum 2.1 – 2.10	4174	4901	4959	5085	10068	4142	2027	4158	1583	6774
3	Successful interviews	750	800	754	751	772	756	400	752	752	750
	Completion rate (= [3] / [2])	15%	14%	13%	13%	7,12%	15%	16,48%	15%	32%	10%
	Average interview time (min:sec)	19:19	18:46	17:29	19:39	17:14	16:43	19:00	23:44	20:19	20:16

Feedback from interviewers

No major problems were reported from the fieldwork with respect to interviewing (comprehensibility of the questionnaire, logical structure). The overall feedback from the survey organisations was that fieldwork ran smoothly and that the questionnaire was well understood by most respondents. The main challenge was the fulfilment of the quotas, which was difficult or impossible in some of the sectors, in particular among the larger size-bands. Some of the more specific remarks from fieldwork organisations, which point at difficulties encountered in the local situation, are summarised in Table 4.

Table 4: Comments by national fieldwork companies on their experience (2006, examples)

Country	Comments
Belgium	<ul style="list-style-type: none"> The questionnaire was very clear. Business-to-business (B2B) research (i.e. surveys on behalf of companies or authorities amongst companies) is often difficult when the questionnaire length is longer than 15 minutes; target persons often complained that they have no time for an interview during their normal work. Positive reaction from respondents that the results can be found on the website.
Bulgaria	<ul style="list-style-type: none"> Many companies (especially within the tourism sector) have outsourced their ICT operations. Therefore, it was sometimes difficult for respondents to understand the questions.
Czech Republic	<ul style="list-style-type: none"> It was difficult to fulfil quotas in several sectors which are mainly represented by very small companies, often by one-person-companies (self-employed), many of which are not willing to do a relatively long interview. There was a high percentage of refusals among micro-companies.
Denmark	<ul style="list-style-type: none"> Some technical terms (such as internet protocol, LAN, W-LAN, VPN, RFID, and EDI) were hard for interviewers and respondents to understand.
Finland	<ul style="list-style-type: none"> The questionnaire was quite long and that is why there were more refusals than normal. Smaller companies often refused to answer or interrupted the interview because they thought that they did not know enough about e-business. Respondents in the pulp and paper sector were especially not interested in this topic due to comparably low ICT usage.
Germany	<ul style="list-style-type: none"> As with previous e-Business surveys carried out, fieldwork ran relative smoothly overall and the questionnaire was easy to understand and interesting for most of respondents. Respondents from small companies often had difficulty when answering questions related to specific technical terms and applications. Respondents reacted positively to the fact that the survey was carried out on behalf of the European Commission.
Greece	<ul style="list-style-type: none"> There were several cases where companies have outsourced the IT support and thus there was no person to interview. Respondents who were not IT specialists found some of the IT terminology difficult to understand.
Spain	<ul style="list-style-type: none"> Fieldwork did not run as smoothly as expected due to several bank holidays occurring during the period, therefore it was difficult to reach the target persons. IT professionals in large companies were the most available.
France	<ul style="list-style-type: none"> In general, the fieldwork went without any problems and the questionnaire was understood by the respondents. For some sectors, the lack of contact addresses was a serious problem. For future surveys, the case concerning new companies which cannot answer the financial questions should be considered.
Hungary	<ul style="list-style-type: none"> The cooperation level in this survey was similar to other telephone surveys among companies; but a problem was that many small companies use only one computer, and only for basic functions.
Ireland	<ul style="list-style-type: none"> The B2B sector (not general population or household surveys) is very over researched in Ireland; hence there was a high level of refusals. In Ireland more than 90% of businesses employ less than 9 employees so many companies do not have the need nor use for ICT.

Italy	<ul style="list-style-type: none"> • Many refusals among the smallest and/or family owned business, where only one PC is available and used more for personal reasons than for business. • Respondents often lost their patience because considering the low use of the PC in their business, they had to spend time on the phone always giving the same answers ("no, do not use ...").
Latvia	<ul style="list-style-type: none"> • The main problem was the length of the questionnaire. Although the average interview length was 16 minutes and thus the shortest of all participating countries, surveys among companies with interviews lasting more than 15 minutes are generally not recommended in Latvia. • It was rather hard for IT managers to answer about budget, market shares and so on.
The Netherlands	<ul style="list-style-type: none"> • The questionnaire was very clear, so positive. • Business-to-business surveys are often difficult when the questionnaire length is longer than 15 minutes. • Secretaries/receptionists in the Netherlands are very well trained in refusing the transferring of a call.
Norway	<ul style="list-style-type: none"> • Interviewers experienced that many respondents / businesses did not wish to participate due to the topic of the survey. Main reason was that they did not feel competent, although they qualified from the results of the screening.
Poland	<ul style="list-style-type: none"> • There were some difficulties in getting an interview with computer/IT specialists. In many big companies they refuse to take time for an interview. • Many small companies did not understand some of the more technical terms.
Sweden	<ul style="list-style-type: none"> • The questionnaire was understood by most of the respondents.
UK	<ul style="list-style-type: none"> • Although some of the questions do appear to be quite technical, this did not prove a particular problem for respondents. • There was a very low universe of companies in certain quota cells. Given the limited sample available in some sectors, and the need to target a high proportion of large companies, a longer field period would probably have helped to maximize the number of complete interviews. • It is becoming increasingly difficult to secure interviews with IT/DP professionals, and we suspect that this situation will only worsen in the future.

Weighting schemes

Due to stratified sampling, the sample size in each size-band is not proportional to the population numbers. If proportional allocation had been used, the sample sizes in the 250+ size-band would have been extremely small, not allowing any reasonable presentation of results. Thus, weighting is required so that results adequately reflect the structure and distribution of enterprises in the population of the respective sector or geographic area. *e-Business W@tch* applies two different weighting schemes: weighting by employment and by the number of enterprises.⁵

- **Weighting by employment:** Values that are reported as employment-weighted figures should be read as "enterprises comprising x% of employees" (in the respective sector or country). The reason for using employment weighting is that there are many more micro-enterprises than any other firms. If the weights did not take into account the economic importance of businesses of different sizes in some way, the results would be dominated by the percentages observed in the micro size-band.
- **Weighting by the number of enterprises:** Values that are reported as "x% of enterprises" show the share of firms irrespective of their size, i.e. a micro-company with a few employees and a large company with thousands of employees both count equally.

⁵ In the tables of this report, data are normally presented in both ways, except for data by size-bands. These are shown in % of firms within a size-band, where employment-weighting is implicit.

The use of filter questions in interviews

In the interviews, not all questions were asked to all companies. The use of filter questions is a common method in standardised questionnaire surveys to make the interview more efficient. For example, questions on the type of internet access used were only asked to those companies that had replied to have internet access. Thus, the question whether a company has Internet access or not serves as a filter for follow-up questions.

The results for filtered questions can be computed on the base of only those enterprises that were actually asked the question (e.g. "in % of enterprises with internet access"), but can also be computed on the base of "all companies". In this report, both methods are used, depending on the indicator. The base (as specified in footnotes of tables and charts) is therefore not necessarily identical to the set of companies that were actually asked the underlying question.

Statistical accuracy of the survey: confidence intervals

Statistics vary in their accuracy, depending on the kind of data and sources. A 'confidence interval' is a measure that helps to assess the accuracy that can be expected from data. The confidence interval is the estimated range of values on a certain level of significance. Confidence intervals for estimates of a population fraction (percentages) depend on the sample size, the probability of error, and the survey result (value of the percentage) itself. Further to this, variance of the weighting factors has negative effects on confidence intervals.

Table 7 gives some indication about the level of accuracy that can be expected for industry totals for the EU-10⁶ (based on all respondents) depending on the weighting scheme applied. For totals of all-sectors (in the EU-10), an accuracy of about +/- 3 percentage points can be expected for most values that are expressed as "% of firms", and of about +/- 2 percentage points for values that are weighted by employment.

The confidence intervals for industry totals (EU-10) differ considerably depending on the industry and the respective value; on average, it is about +/- 5 percentage points (in both weighting schemes). Confidence intervals are highest for the shipbuilding and repair industry, due to the small number of observations, and because this sector is more sensitive to weights due to its structure (i.e. the dominance of large firms in a comparatively small population). Data for this industry are therefore indicative and cannot claim to have statistical accuracy.

The calculation of confidence intervals is based on the assumption of (quasi-) infinite population universes. In practice, however, in some industries and in some countries the complete population of businesses consists of only several hundred or even a few dozen enterprises. In some cases, literally each and every enterprise within a country-industry and size-band cell was contacted and asked to participate in the survey. This means that it is practically impossible to achieve a higher confidence interval through representative enterprise surveys in which participation is not obligatory. This should be borne in mind when comparing the confidence intervals of *e-Business W@tch* surveys to those commonly found in general population surveys.

⁶ The EU-10 are composed of those countries in which all 10 sectors were covered by the survey. To ensure data comparability, only interviews from these countries are included in the aggregated "total" values. The EU-10 are: CZ, DE, ES, FR, IT, HU, NL, PL, FI, UK. These 10 countries represent more than 80% of the population and GDP of the EU.

Table5: Confidence intervals for all-sector and sector totals (EU-10)

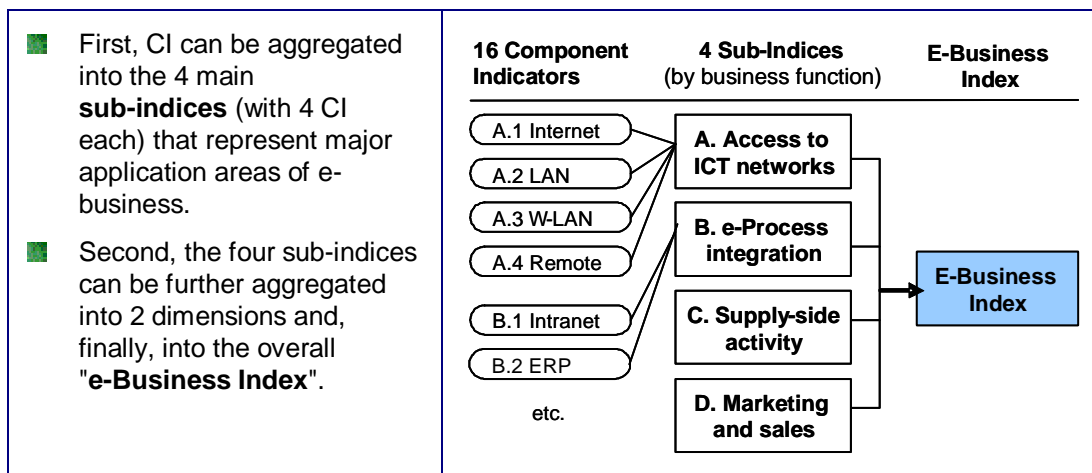
	Survey result	Confidence interval								
		Weighted as "% of firms"			Weighted by employment			Unweighted		
All sectors (aggregate), EU-10	10%	8.1%	-	12.3%	8.7%	-	11.5%	9.4%	-	10.6%
Food and beverages	10%	6.6%	-	14.8%	7.3%	-	13.6%	8.4%	-	11.9%
Footwear	10%	7.5%	-	13.2%	7.6%	-	13.1%	8.4%	-	11.9%
Pulp and paper	10%	7.8%	-	12.7%	7.5%	-	13.3%	8.5%	-	11.7%
ICT manufacturing	10%	7.9%	-	12.6%	7.6%	-	13.0%	8.7%	-	11.5%
Consumer electronics	10%	7.4%	-	13.4%	6.0%	-	16.2%	8.0%	-	12.4%
Shipbuilding and repair	10%	4.8%	-	19.7%	4.6%	-	20.4%	6.0%	-	16.1%
Construction	10%	6.9%	-	14.3%	7.6%	-	13.1%	8.3%	-	11.9%
Tourism	10%	6.6%	-	14.8%	6.8%	-	14.4%	8.3%	-	12.0%
Telecommunication services	10%	7.6%	-	13.1%	6.6%	-	14.8%	8.4%	-	11.9%
Hospital activities	10%	7.2%	-	13.7%	7.2%	-	13.8%	8.1%	-	12.3%
All sectors (aggregate), EU-10	30%	26.8%	-	33.4%	27.9%	-	32.2%	29.1%	-	30.9%
Food and beverages	30%	24.2%	-	36.6%	25.4%	-	35.0%	27.4%	-	32.8%
Footwear	30%	25.9%	-	34.5%	26.0%	-	34.3%	27.3%	-	32.8%
Pulp and paper	30%	26.4%	-	33.9%	25.8%	-	34.6%	27.6%	-	32.5%
ICT manufacturing	30%	26.5%	-	33.8%	26.1%	-	34.2%	27.9%	-	32.2%
Consumer electronics	30%	25.6%	-	34.8%	22.9%	-	38.1%	26.8%	-	33.5%
Shipbuilding and repair	30%	20.2%	-	42.0%	19.7%	-	42.8%	23.0%	-	38.1%
Construction	30%	24.7%	-	35.9%	25.9%	-	34.4%	27.3%	-	32.8%
Tourism	30%	24.2%	-	36.5%	24.6%	-	36.1%	27.3%	-	32.9%
Telecommunication services	30%	25.9%	-	34.4%	24.2%	-	36.5%	27.4%	-	32.7%
Hospital activities	30%	25.3%	-	35.2%	25.3%	-	35.2%	26.9%	-	33.4%
All sectors (aggregate), EU-10	50%	46.4%	-	53.6%	47.6%	-	52.4%	49.0%	-	51.0%
Food and beverages	50%	43.2%	-	56.8%	44.7%	-	55.3%	47.0%	-	53.0%
Footwear	50%	45.3%	-	54.7%	45.5%	-	54.5%	47.0%	-	53.0%
Pulp and paper	50%	45.9%	-	54.1%	45.2%	-	54.8%	47.3%	-	52.7%
ICT manufacturing	50%	46.0%	-	54.0%	45.5%	-	54.5%	47.7%	-	52.3%
Consumer electronics	50%	45.0%	-	55.0%	41.7%	-	58.3%	46.3%	-	53.7%
Shipbuilding and repair	50%	38.2%	-	61.8%	37.5%	-	62.5%	41.8%	-	58.2%
Construction	50%	43.9%	-	56.1%	45.4%	-	54.6%	47.0%	-	53.0%
Tourism	50%	43.3%	-	56.7%	43.7%	-	56.3%	46.9%	-	53.1%
Telecommunication services	50%	45.4%	-	54.6%	43.3%	-	56.7%	47.1%	-	52.9%
Hospital activities	50%	44.6%	-	55.4%	44.6%	-	55.4%	46.5%	-	53.5%
All sectors (aggregate), EU-7	70%	66.6%	-	73.2%	67.8%	-	72.1%	69.1%	-	70.9%
Food and beverages	70%	63.4%	-	75.8%	65.0%	-	74.6%	67.2%	-	72.6%
Footwear	70%	65.5%	-	74.1%	65.7%	-	74.0%	67.2%	-	72.7%
Pulp and paper	70%	66.1%	-	73.6%	65.4%	-	74.2%	67.5%	-	72.4%
ICT manufacturing	70%	66.2%	-	73.5%	65.8%	-	73.9%	67.8%	-	72.1%
Consumer electronics	70%	65.2%	-	74.4%	61.9%	-	77.1%	66.5%	-	73.2%
Shipbuilding and repair	70%	58.0%	-	79.8%	57.2%	-	80.3%	61.9%	-	77.0%
Construction	70%	64.1%	-	75.3%	65.6%	-	74.1%	67.2%	-	72.7%
Tourism	70%	63.5%	-	75.8%	63.9%	-	75.4%	67.1%	-	72.7%
Telecommunication services	70%	65.6%	-	74.1%	63.5%	-	75.8%	67.3%	-	72.6%
Hospital activities	70%	64.8%	-	74.7%	64.8%	-	74.7%	66.6%	-	73.1%
All sectors (aggregate), EU-7	90%	87.7%	-	91.9%	88.5%	-	91.3%	89.4%	-	90.6%
Food and beverages	90%	85.2%	-	93.4%	86.4%	-	92.7%	88.1%	-	91.6%
Footwear	90%	86.8%	-	92.5%	86.9%	-	92.4%	88.1%	-	91.6%
Pulp and paper	90%	87.3%	-	92.2%	86.7%	-	92.5%	88.3%	-	91.5%
ICT manufacturing	90%	87.4%	-	92.1%	87.0%	-	92.4%	88.5%	-	91.3%
Consumer electronics	90%	86.6%	-	92.6%	83.8%	-	94.0%	87.6%	-	92.0%
Shipbuilding and repair	90%	80.3%	-	95.2%	79.6%	-	95.4%	83.9%	-	94.0%
Construction	90%	85.7%	-	93.1%	86.9%	-	92.4%	88.1%	-	91.7%
Tourism	90%	85.2%	-	93.4%	85.6%	-	93.2%	88.0%	-	91.7%
Telecommunication services	90%	86.9%	-	92.4%	85.2%	-	93.4%	88.1%	-	91.6%
Hospital activities	90%	86.3%	-	92.8%	86.2%	-	92.8%	87.7%	-	91.9%

confidence intervals at $\alpha=.90$

The e-Business Scoreboard 2006

The e-Business Scoreboard approach was developed by *e-Business W@tch* in 2004. It is a compound index that condenses data on ICT adoption and e-business activity, enabling comparisons across different sectors, countries or size-bands.

Conceptually, the e-Business Scoreboard owes a debt to the Balanced Scorecard (BSC) approach, which suggests that an organisation should be viewed from four perspectives, and that metrics (and targets) are to be defined for each perspective. Similarly, the e-Business Scoreboard looks at ICT use by enterprises from four (inter-related) perspectives. The Scoreboard consists of **16 component indicators** (see next page), which represent the metrics for these perspectives. Component indicators (CI) can be aggregated on several levels.



The e-Business Scoreboard takes into account the percentages (diffusion rates) from all sectors (size-bands, ...) and show how a specific sector (size-band, ...) differs from the all-sector-average. An index value is based on mean values and standard deviations. 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 (size-bands, ...).

Indexes simplify multi-dimensional concepts. To correctly assess the validity and shortcomings of the Scoreboard and its overall index, the following notes should be taken into account:

- **Weighting:** Results are influenced by the selection of the underlying weighting scheme for component indicators. If employment-weighted figures are used, e-business activity in large firms is emphasized. If indicators are weighted by the number of enterprises (irrespective of their size), the situation in smaller firms is emphasized.
- **Component indicators:** The selection of component indicators may have a bias towards manufacturing activities, as some indicators can be more relevant for manufacturing than for service sectors (e.g. ERP use).
- **Relative comparison:** The Scoreboard results do not represent absolute measures of e-business activity, but depend on the respective set of sectors (or countries, ...) that are compared to each other, because figures express standard deviations from the *average* of the respective set.

Component indicators of the e-Business Scoreboard 2006

(Definitions for indicators weighted by employment)

A. ICT infrastructure and basic connectivity		
A.1	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. Enterprises that are connected with broadband (via DSL, cable, direct fibre or wireless broadband) are computed with a factor of 1.0, enterprises connected via analogue dial-up modem or ISDN with a factor of 0.5. The maximum value of 100 would be returned if all employees work in enterprises with broadband connections.
A.2	Use of LAN	= the percentage of employees from a sector working in enterprises that have connected computers with a Local Area Network (LAN).
A.3	Use of a Wireless LAN	= the percentage of employees working in enterprises which use a Wireless LAN.
A.4	Remote access to the company's computer 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.
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 an ERP system	= the percentage of employees working in enterprises that have implemented an ERP (enterprise resource planning) system.
B.3	Use of online technology to track working hours and/or production time	= the percentage of employees working in enterprises that use online technologies (other than e-mail) to track working hours and/or production times.
B.4	Companies sending or receiving e-invoices	= the percentage of employees working in enterprises that send and/or receive e-invoices.
C. Procurement and supply chain integration		
C.1	Companies placing >5% of their orders to suppliers online	= the percentage of employees working in enterprises saying that they place orders to suppliers online on the web or via other computer-mediated networks, for example via EDI based connections to their suppliers, and that these online orders account for at least 5% of their total orders.
C.2	Use of specific ICT solutions for e-procurement	= the percentage of employees working in enterprises that use specific IT solutions to support the selection of their suppliers and/or procurement processes.
C.3	Companies linking their ICT system with suppliers	= the percentage of employees that work in enterprises whose ICT system is linked with those of suppliers.
C.4	Companies managing capacity and inventory online	= the percentage of employees working in enterprises that that use technologies to manage capacity and inventory online.
D. Marketing and sales processes		
D.1	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.2	Companies receiving >5% of orders from customers online	= the percentage of employees working in enterprises saying that they accept orders from customers online on the web or via other computer-mediated networks, and that these online orders account for at least 5% of their total orders received.
D.3	Use of specific ICT solutions to support marketing and sales processes	= the percentage of employees working in enterprises that uses specific IT solutions to support marketing and sales processes.
D.4	Companies linking their ICT system with customers	= the percentage of employees that work in enterprises whose ICT system is linked with those of customers.