

# 9.

## SCIENCE AND TECHNOLOGY



### Research and development

Personnel

Expenditure

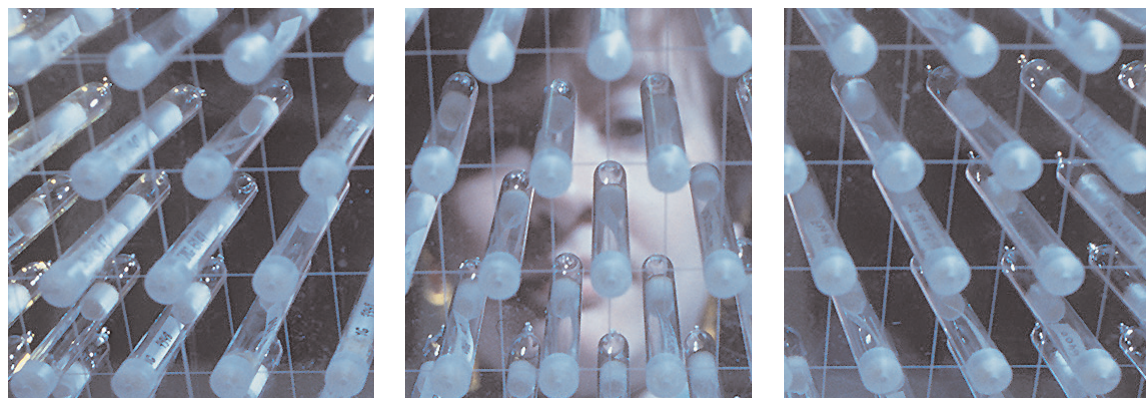
Patents

### Information society

Internet access and ICT expenditure

Telecommunications





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## 9. SCIENCE AND TECHNOLOGY

Research and development (R & D) is a driving force behind economic growth, job creation, innovation of new products, and increasing quality of products. At the Lisbon summit in March 2000, the European Council set a clear strategic objective for Europe in the next decade: to make the EU the *'most competitive and dynamic knowledge-based economy in the world'*.

The sixth framework programme (FP6)<sup>(42)</sup> is the current instrument used by the European Union to fund research in Europe. Proposed by the European Commission and adopted by the Council and Parliament, it is open to all public and private entities, large or small. The overall budget covering the four-year period 2003–06 is EUR 17.5 billion, representing an increase of 17 % from the fifth framework programme (FP5) and making up 3.9 % of the EU's total budget in 2001, or 6 % of the public (civilian), research budget.

<sup>(42)</sup> More information concerning this research programme is available at <http://ec.europa.eu/research/fp6>.

Eurostat has a wide range of data within this area, including:

- innovation;
- human resources in science and technology;
- patent applications to the European Patent Office;
- patents granted by the United States Patent and Trademark Office;
- R & D expenditure;
- R & D government budget appropriations or outlays;
- scientific and technical R & D personnel;
- employment in high-technology sectors;
- access of households to information and communication technology (ICT);
- access of enterprises to ICT;
- expenditure on ICT;
- e-commerce;
- e-skills;
- market structures within telecommunication;
- prices of a range of telecommunications services.

Seven key areas for the advancement of knowledge and technological progress are identified within FP6:

- genomics and biotechnology for health;
- information society technologies;
- nanotechnologies and nanosciences;
- aeronautics and space;
- food safety;
- sustainable development; and
- economic and social sciences.

With a view towards achieving the biggest possible impact, over EUR 12 000 million is being allocated to them. The main focus of FP6 is the creation of a European research area (ERA) as a vision for the future of research in Europe. It aims at scientific excellence, improved competitiveness and innovation through the promotion of increased cooperation, greater complementarity and improved coordination between relevant actors.

On 6 April 2005, the European Commission adopted a proposal for a new EU programme for research — the seventh framework programme (FP7) <sup>(43)</sup>, designed to give new impetus towards growth and competitiveness. The next programme will place greater emphasis on research that is relevant to the needs of European industry, while also aiming to make participation in the research programme simpler. On 15 June 2006 the European Parliament proposed a number of amendments, which the Commission adopted on 28 June 2006, while the Council reached a political agreement on 24 July 2006. At the time of writing, these amended proposals are destined to be forwarded to the European Parliament for a second reading.

Information technology is developing day by day. However, the information society, a society whose wealth and growth are based on its ability to handle information efficiently, is not only a technical phenomenon, it is also transforming the way in which we communicate, do business, and live everyday lives.

The information society holds enormous potential and opportunities for Europe's economy and societies. The eEurope action plan was launched at the Seville Council in June 2002 and endorsed by the Council of Ministers in January 2003. It aims to develop modern public services and a dynamic environment for e-business through widespread availability of broadband access at competitive prices and a secure information infrastructure.

<sup>(43)</sup> Proposal for a decision of the European Parliament and of the Council concerning the seventh framework programme of the European Community for research, technological development and demonstration activities (2007 to 2013), 6 April 2005, COM(2005) 119 final (more information is available at [http://ec.europa.eu/research/fp7/home\\_en.html](http://ec.europa.eu/research/fp7/home_en.html)).

## RESEARCH AND DEVELOPMENT

On 14 September 2006 the European Commission launched an ambitious 10 point innovation plan, calling for urgent action at regional, national and European levels. The plan was produced following a request from Heads of State or Government for an innovation strategy that would '*translate investments in knowledge into products and services*'. The 10 points in full are:

- establish innovation-friendly education systems;
- establish a European Institute of Technology;
- develop a single labour market for researchers;
- strengthen links between researchers and industry;
- nurture regional innovation through new cohesion policy programmes;
- reform State aid rules for R & D and innovation and provide better guidance for R & D tax incentives;
- improve protection for intellectual property rights;
- introduce copyright levies for digital products and services;
- develop a strategy for innovation-friendly lead-markets;
- stimulate innovation through public and private procurement.

Eurostat aims to support these goals through the provision of reliable statistical information on R & D, innovation and patents, as well as a relatively new data collection exercise that focuses on the development of information and communication technologies (ICT), where statistics are being developed with respect to emerging information technologies, so as to measure, for example, the impact of the Internet.

Most research and development (R & D) indicators are calculated annually and are available at a national and regional levels (NUTS 2 level — see page 351 for a listing of these regions). Depending on the indicator in question, data are available not only for the 25 Member States of the EU, but also for other members of the European Economic Area, the acceding and candidate countries, Japan and the United States.

Data on R & D expenditure and personnel, as well as on government budget appropriations or outlays for research and development (GBAORD) are collected every year from the national statistical offices.



## PERSONNEL

Data on scientific and technical R & D personnel provide indicators for useful international comparisons of human resources devoted to R & D. For statistical purposes, indicators on R & D personnel are compiled in terms of persons, i.e. head counts (HC) or as full-time equivalents (FTEs) or person-years, by gender. Eurostat compiles a number of series in relation to stocks of Human Resources in Science and Technology (HRST). Breakdowns are given according to gender, age, region, sector of activity, occupation, educational attainment and fields of education (although it should be noted that not all combinations are possible). This information is derived from the European Union labour force survey (LFS). Stocks provide information on the number of HRST at a particular point in time. In this database, stocks relate to the employment status as well as the occupational and educational profiles of individuals.

At the EU-15 level, R & D personnel as a proportion of the labour force has seen a modest increase over the last decade, with the Nordic countries taking the lead. In 2003, the average proportion of R & D personnel in the labour force across the EU-25 was about 1.3 %. The share was a little higher (about 1.4 %) on average across the EU-15.

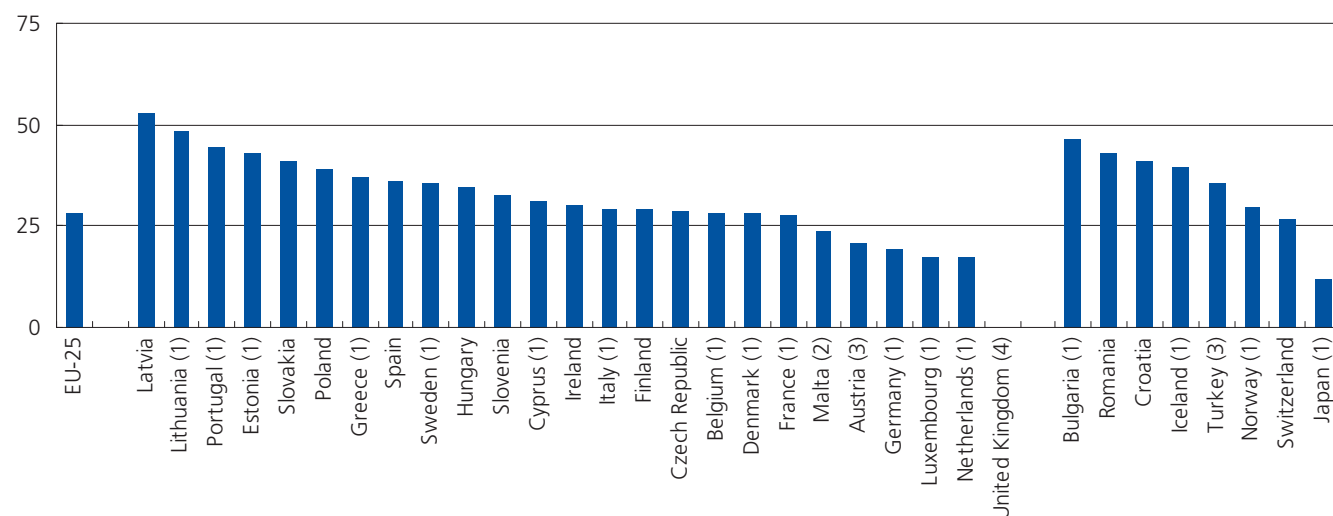
The importance of high-technology sectors has increased considerably over the last few years and this has had a significant impact on the structure and organisation of employment in Europe. In order to permit analysis of knowledge- and technology-intensive sectors, Eurostat collects data on employment in high-technology and medium-high-technology manufacturing sectors, knowledge-intensive services (KIS), and high-technology service sectors (for definitions, see the [glossary](#)).

Data on employment in high-technology and knowledge-intensive sectors and related derived indicators are built-up using data from the EU labour force survey (LFS). Data are available both at the national and regional levels. Within Europe, Sweden, the United Kingdom and Finland reported relatively high proportions of total employment within high- and medium-high-technology sectors. In the services sector, Germany had the highest share of total employment in knowledge-intensive service (KIS) sectors in 2004.

**Figure 9.1: Proportion of women researchers in all institutional sectors, 2004**

(% of total researchers)

TSC00006



(1) 2003.

(2) Break in series.

(3) 2002.

(4) Not available.

*Human resources in science and technology (HRST) as a share of the female economically active population in the age group 25-64: this indicator gives the percentage of the female labour force in the age group 25-64, that is classified as HRST, i.e. having either successfully completed an education at the third level in an S & T field of study or is employed in an occupation where such an education is normally required. HRST are measured mainly using the concepts and definitions laid down in the Canberra Manual, OECD, Paris, 1994.*

Table 9.1: Researchers in all institutional sectors

(1 000 FTE)

TSC00004

	1994 (1)	1995 (2)	1996 (3)	1997 (4)	1998	1999	2000 (5)	2001	2002 (6)	2003	2004
<b>EU-25</b>	900	927	947	960	996	1 040	1 078	1 115	1 149	1 176	1 218
<b>EU-15</b>	800	824	843	853	886	929	965	1 000	1 035	1 060	1 096
<b>Euro area</b>	619	629	646	652	672	706	743	768	782	804	834
<b>Belgium</b>	23	23	25	26	28	30	31	32	31	31	32
<b>Czech Republic</b>	:	12	13	13	13	14	14	15	15	16	16
<b>Denmark</b>	:	16	17	18	:	19	:	19	26	25	27
<b>Germany</b>	:	231	230	236	238	255	258	264	266	269	270
<b>Estonia</b>	:	:	:	:	3	3	3	3	3	3	3
<b>Greece</b>	:	10	:	11	:	15	:	14	:	15	16
<b>Spain</b>	48	47	52	54	60	62	77	80	83	93	101
<b>France</b>	149	151	155	155	156	160	172	177	186	193	:
<b>Ireland</b>	5	6	6	7	8	8	9	9	9	10	11
<b>Italy</b>	76	76	76	66	65	65	66	67	71	70	:
<b>Cyprus</b>	:	:	:	:	0	0	0	0	0	0	1
<b>Latvia</b>	3	3	3	3	3	3	4	3	3	3	3
<b>Lithuania</b>	:	:	8	8	8	9	8	8	6	7	7
<b>Luxembourg</b>	:	:	:	:	:	:	2	:	:	2	2
<b>Hungary</b>	12	10	10	11	12	13	14	15	15	15	15
<b>Malta</b>	:	:	:	:	:	:	:	:	0	0	:
<b>Netherlands</b>	34	35	36	38	39	40	42	46	38	37	:
<b>Austria</b>	:	:	:	:	19	:	:	:	24	:	:
<b>Poland</b>	47	50	52	56	56	56	55	56	57	59	61
<b>Portugal</b>	10	12	13	14	15	16	17	18	19	20	22
<b>Slovenia</b>	5	5	4	4	4	4	4	4	5	4	4
<b>Slovakia</b>	10	10	10	10	10	9	10	10	9	10	11
<b>Finland</b>	:	:	:	:	:	:	:	:	:	:	41
<b>Sweden</b>	:	34	:	37	:	40	:	46	:	48	49
<b>United Kingdom</b>	134	146	145	146	158	:	:	:	:	:	:
<b>Bulgaria</b>	13	14	15	12	12	11	9	9	9	10	10
<b>Croatia</b>	:	:	:	:	:	:	:	:	9	6	7
<b>Romania</b>	34	33	30	28	27	23	20	20	20	21	21
<b>Turkey</b>	14	16	18	19	19	20	23	23	24	:	:
<b>Iceland</b>	1	1	1	1	1	2	:	2	:	2	2
<b>Norway</b>	:	16	:	17	:	18	:	20	:	21	:
<b>Switzerland</b>	:	:	22	:	:	:	26	:	:	:	25
<b>Japan</b>	541	552	617	625	653	659	648	676	647	675	:
<b>United States</b>	:	1 036	:	1 160	:	1 261	:	:	:	:	:

(1) Break in series, the Netherlands and the United Kingdom.

(2) Break in series, Greece and Norway.

(3) Break in series, the Netherlands and Japan.

(4) Break in series, France, Italy and Slovakia.

(5) Break in series, France.

(6) Break in series, the Netherlands and Japan.

Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems, and in the management of the projects concerned; FTE (full-time equivalent) corresponds to one year's work by one person (for example, a person who devotes 40 % of his time to R & D is counted as 0.4 FTE).

Institutional sectors: business enterprise, government, higher education, and private non-profit.



Table 9.2: PhD students, 2004

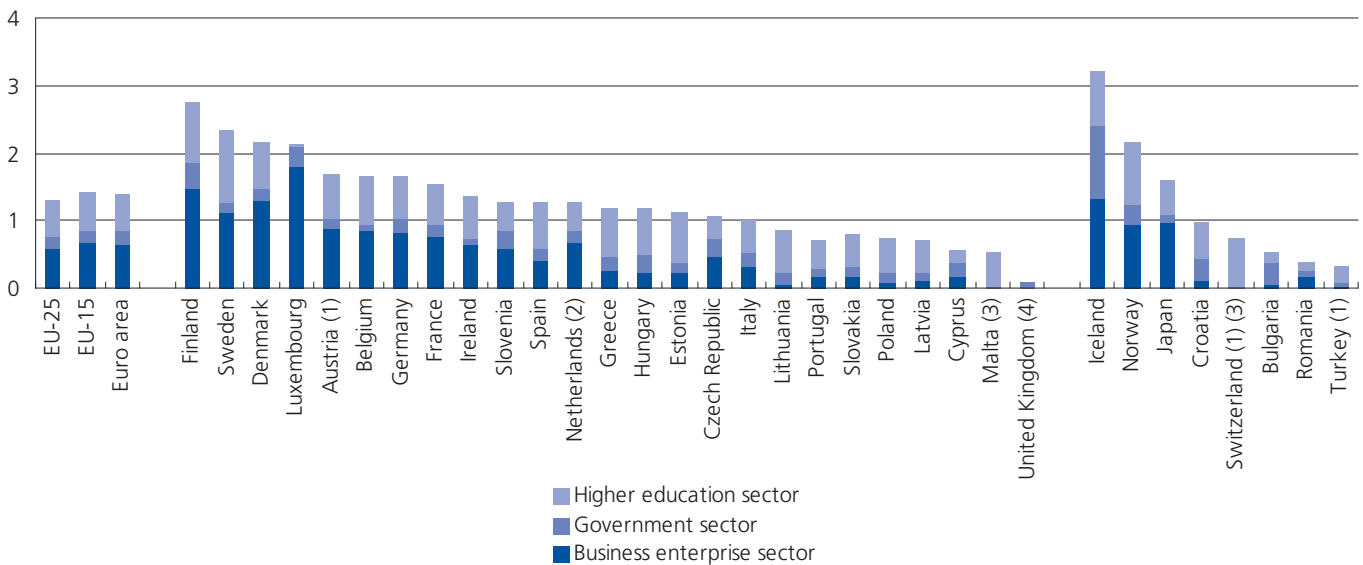
	PhD students		Science, mathematics and computing		Engineering, manufacturing and construction	
	(number)	Female (% of total)	(number)	(% of all PhD students)	(number)	(% of all PhD students)
<b>EU-25</b>	401 386	46.6	85 547	21.3	65 737	16.4
<b>EU-15</b>	322 924	47.4	71 168	22.0	48 232	14.9
<b>Euro area</b>	205 993	49.0	41 772	20.3	29 346	14.2
<b>Belgium</b>	7 014	38.9	2 143	30.6	946	13.5
<b>Czech Republic</b>	23 282	36.4	5 005	21.5	6 856	29.4
<b>Denmark</b>	5 093	43.2	926	18.2	1 018	20.0
<b>Germany</b>	:	:	:	:	:	:
<b>Estonia</b>	1 653	53.5	469	28.4	219	13.2
<b>Greece</b>	18 907	41.9	8 346	44.1	2 277	12.0
<b>Spain</b>	76 895	50.7	11 486	14.9	7 782	10.1
<b>France</b>	:	:	:	:	:	:
<b>Ireland</b>	4 339	45.7	1 613	37.2	705	16.2
<b>Italy</b>	37 608	51.0	9 486	25.2	7 305	19.4
<b>Cyprus</b>	202	49.5	85	42.1	5	2.5
<b>Latvia</b>	1 425	58.2	225	15.8	209	14.7
<b>Lithuania</b>	2 623	55.7	488	18.6	577	22.0
<b>Luxembourg</b>	:	:	:	:	:	:
<b>Hungary</b>	7 835	42.3	1 813	23.1	840	10.7
<b>Malta</b>	17	23.5	0	0.0	0	0.0
<b>Netherlands</b>	7 054	41.1	:	:	:	:
<b>Austria</b>	15 524	45.5	2 558	16.5	2 037	13.1
<b>Poland</b>	32 054	47.6	4 892	15.3	6 544	20.4
<b>Portugal</b>	17 445	54.0	3 080	17.7	2 813	16.1
<b>Slovenia</b>	:	:	:	:	:	:
<b>Slovakia</b>	9 371	40.6	1 402	15.0	2 255	24.1
<b>Finland</b>	21 207	50.5	3 060	14.4	5 481	25.8
<b>Sweden</b>	22 460	47.1	4 492	20.0	4 994	22.2
<b>United Kingdom</b>	89 378	43.9	23 978	26.8	12 874	14.4
<b>Bulgaria</b>	4 834	51.0	766	15.8	1 107	22.9
<b>Croatia</b>	541	44.5	63	11.6	124	22.9
<b>Romania</b>	18 045	51.4	1 799	10.0	2 916	16.2
<b>Turkey</b>	24 891	38.8	3 608	14.5	4 682	18.8
<b>Iceland</b>	51	52.9	7	13.7	5	9.8
<b>Norway</b>	4 356	42.6	1 207	27.7	645	14.8
<b>Switzerland</b>	15 850	38.8	4 525	28.5	1 686	10.6
<b>Japan</b>	71 389	28.5	10 368	14.5	13 170	18.4
<b>United States</b>	375 642	50.7	:	:	:	:

Second stage of tertiary education, covering programmes leading to an advanced research qualification (e.g. PhD or Doctorate — ISCED level 6), which are devoted to advanced study and original research and not based on course-work only.

**Figure 9.2: Proportion of research and development personnel by sector, 2003**

(% of the labour force)

TSC00002



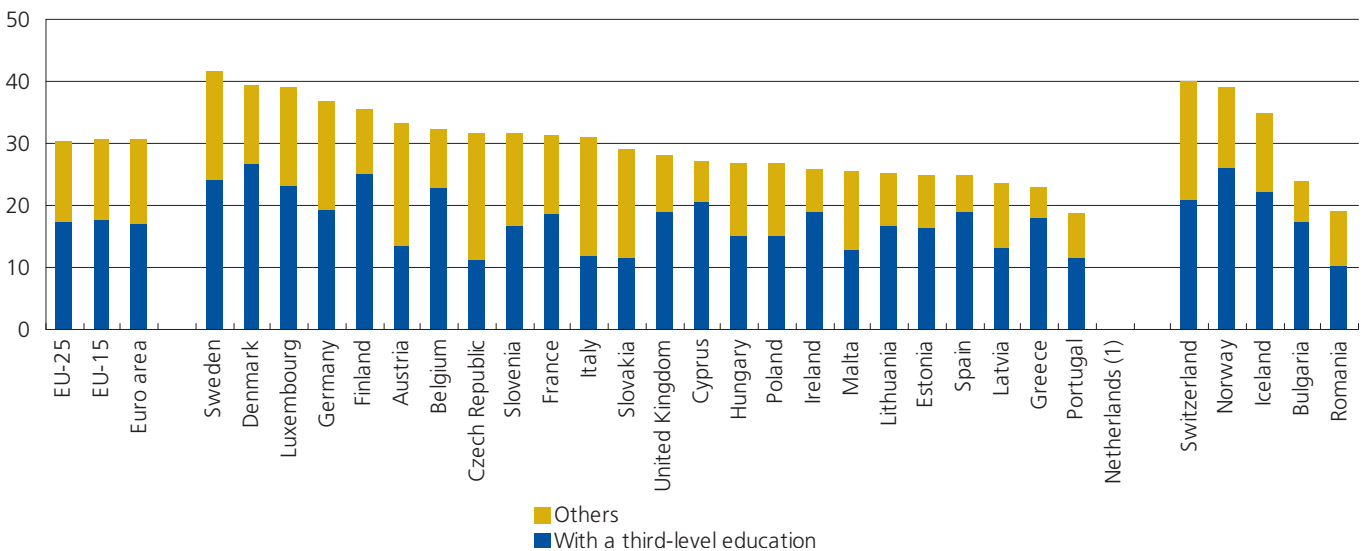
- (1) 2002.
- (2) Break in series, government sector.
- (3) Business enterprise sector not available.
- (4) Business enterprise sector and higher education sector not available.

R & D personnel include all persons employed directly on R & D, plus persons supplying direct services to R & D, such as managers, administrative staff and office staff; head count (HC) data measure the total number of R & D personnel who are mainly or partly employed on R & D; R & D personnel in HC are expressed as a percentage of the labour force (comprises population aged 15 and over who are employed or unemployed but not inactive).

**Figure 9.3: Human resources working in science and technology occupations, all sectors, 2004**

(% of total employment)

TSC00011



- (1) Not available.

Human resources in science and technology (HRST) as a share of the economically active population in the age group 25-64; this indicator gives the percentage of the total labour force in the age group 25-64, that is classified as HRST, i.e. having either successfully completed an education at the third level in an S & T field of study or is employed in an occupation where such an education is normally required. HRST are measured mainly using the concepts and definitions laid down in the Canberra Manual, OECD, Paris, 1994.





Table 9.3: Human resources in science and technology for all sectors

	People working in a S&T occupation					People who have a third level education and work in a S&T occupation				
	(1 000)	(% of total employment)				(1 000)	(% of total employment)			
	2004	2001	2002	2003	2004	2004	2001	2002	2003	2004
<b>EU-25</b>	51 245	29.2	29.5	30.0	30.2	29 458	16.3	16.3	16.9	17.4
<b>EU-15</b>	44 112	29.7	30.0	30.5	30.6	25 754	17.0	17.0	17.5	17.9
<b>Euro area</b>	35 066	29.9	30.2	30.7	30.7	19 725	16.5	16.5	17.0	17.2
<b>Belgium</b>	1 212	31.1	30.8	31.7	32.2	868	22.2	21.4	22.5	23.1
<b>Czech Republic</b>	1 341	30.9	30.0	31.0	31.6	475	10.5	10.5	10.8	11.2
<b>Denmark</b>	920	38.0	38.8	38.7	39.3	626	23.6	24.5	25.9	26.7
<b>Germany</b>	11 509	35.0	35.5	36.5	36.9	6 028	17.9	17.0	18.7	19.3
<b>Estonia</b>	129	24.9	27.7	25.6	25.0	84	17.4	18.6	17.1	16.4
<b>Greece</b>	895	20.2	20.7	21.2	22.9	703	15.8	16.2	16.3	18.0
<b>Spain</b>	3 934	23.5	24.0	23.6	24.8	3 046	17.8	18.2	18.0	19.2
<b>France</b>	6 806	29.5	30.0	30.8	31.4	4 065	18.6	19.0	18.1	18.8
<b>Ireland</b>	389	22.9	24.0	25.0	25.7	287	16.3	17.2	18.4	19.0
<b>Italy</b>	6 338	28.7	29.0	29.0	31.1	2 429	10.7	11.0	11.0	11.9
<b>Cyprus</b>	79	26.0	27.1	27.8	26.9	60	18.7	20.5	20.9	20.6
<b>Latvia</b>	207	25.1	26.8	24.1	23.5	117	13.1	13.4	11.6	13.3
<b>Lithuania</b>	329	25.7	24.8	23.8	25.1	219	23.6	15.6	15.2	16.7
<b>Luxembourg</b>	68	32.7	33.5	34.1	39.1	40	18.4	19.0	15.0	23.2
<b>Hungary</b>	959	24.7	24.8	26.2	26.9	541	12.8	12.9	14.2	15.2
<b>Malta</b>	29	:	23.8	25.0	25.6	15	:	10.3	10.6	13.1
<b>Netherlands</b>	:	37.6	37.2	40.1	:	:	19.4	19.4	22.4	:
<b>Austria</b>	1 048	26.2	27.0	26.8	33.3	431	10.8	12.6	12.3	13.7
<b>Poland</b>	3 243	25.0	25.2	26.5	26.8	1 833	11.7	12.2	14.0	15.1
<b>Portugal</b>	800	16.0	16.1	15.7	18.6	498	9.2	9.4	9.3	11.6
<b>Slovenia</b>	260	27.1	28.9	31.1	31.6	137	12.0	12.6	16.2	16.7
<b>Slovakia</b>	556	29.6	29.8	29.4	29.2	222	10.3	10.8	11.1	11.7
<b>Finland</b>	741	38.2	34.6	34.6	35.5	526	24.7	24.2	24.6	25.2
<b>Sweden</b>	1 583	39.9	40.5	40.9	41.5	923	22.2	23.1	23.6	24.2
<b>United Kingdom</b>	6 545	26.4	26.7	27.3	28.0	4 479	17.6	18.0	18.4	19.1
<b>Bulgaria</b>	638	26.7	26.1	25.2	23.8	465	18.2	18.4	17.8	17.4
<b>Croatia</b>	:	:	:	:	:	:	:	:	:	:
<b>Romania</b>	1 502	17.4	19.2	18.7	19.1	800	8.7	9.6	9.3	10.2
<b>Turkey</b>	:	:	:	:	:	:	:	:	:	:
<b>Iceland</b>	44	33.1	33.3	35.3	35.0	28	18.0	19.6	22.6	22.2
<b>Norway</b>	759	38.2	37.6	37.9	39.0	508	26.3	26.0	25.3	26.1
<b>Switzerland</b>	1 292	38.8	37.7	39.2	39.9	678	19.2	18.6	20.2	20.9

**Table 9.4: Proportion of persons working in high- and medium-high-technology manufacturing and knowledge-intensive service sectors**

(% of total employment)

TSC00011 TSC00012

	Employment in high- and medium-high-technology manufacturing			Employment in knowledge-intensive services		
	1995	2000 (1)	2004	1995	2000	2004
<b>EU-25</b>	:	5.8	5.7	:	29.2	33.1
<b>EU-15</b>	6.3	6.3	5.8	29.9	32.3	34.6
<b>Euro area</b>	6.4	6.4	6.1	27.6	30.0	32.3
<b>Belgium</b>	6.5	6.1	5.6	32.9	36.8	38.6
<b>Czech Republic</b>	:	7.7	7.7	:	24.1	24.6
<b>Denmark</b>	6.1	5.4	5.0	39.0	42.1	42.3
<b>Germany</b>	9.2	9.3	9.4	26.9	30.4	33.4
<b>Estonia</b>	:	2.9	3.4	:	26.9	27.5
<b>Greece</b>	2.1	2.0	2.1	20.1	22.2	24.9
<b>Spain</b>	4.7	4.8	4.3	22.2	24.5	26.1
<b>France</b>	5.7	5.8	5.3	33.5	34.7	36.2
<b>Ireland</b>	4.3	3.5	3.8	29.2	31.7	33.4
<b>Italy</b>	6.2	6.6	6.4	24.0	26.7	30.2
<b>Cyprus</b>	:	1.1	1.0	:	25.2	26.2
<b>Latvia</b>	:	0.5	1.3	:	24.8	24.6
<b>Lithuania</b>	:	2.5	1.9	:	26.3	25.0
<b>Luxembourg</b>	1.7	1.8	0.9	30.5	35.5	38.0
<b>Hungary</b>	:	5.9	5.7	:	26.5	28.5
<b>Malta</b>	:	:	3.6	:	:	29.1
<b>Netherlands</b>	3.8	3.5	2.6	36.7	39.2	41.0
<b>Austria</b>	4.8	4.7	4.9	25.6	28.1	31.3
<b>Poland</b>	:	:	4.4	:	:	24.3
<b>Portugal</b>	:	3.1	3.1	:	19.2	22.2
<b>Slovenia</b>	:	7.8	7.3	:	22.7	24.2
<b>Slovakia</b>	:	5.8	7.0	:	24.5	25.1
<b>Finland</b>	5.2	5.3	4.9	37.3	37.9	40.3
<b>Sweden</b>	6.0	6.4	6.0	44.2	45.7	47.0
<b>United Kingdom</b>	6.0	5.8	4.6	36.8	39.7	42.1
<b>Bulgaria</b>	:	5.0	4.2	:	21.2	22.2
<b>Croatia</b>	:	:	4.4	:	:	21.0
<b>Romania</b>	:	4.7	5.3	:	10.8	14.1
<b>Iceland</b>	1.3	1.4	2.0	38.2	39.3	42.8
<b>Norway</b>	:	3.8	3.4	:	42.3	45.6
<b>Switzerland</b>	:	5.3	5.0	:	36.1	39.8

(1) Break in series, the Netherlands.

Statistics on high-tech industries and knowledge-intensive industries comprise economic, science, technology, innovation and employment data describing manufacturing and services industries broken down by technological intensity:

High-technology — aerospace (NACE 35.3); pharmaceuticals (24.4); computers, office machinery (30); electronics-communications (3 2); scientific instruments (33);

Medium-high-technology — electrical machinery (31); motor vehicles (34); chemicals — excl. pharmaceuticals (24 excl. 24.4); other transport equipment (35.2 + 35.4 + 35.5); non-electrical machinery (29);

Knowledge-intensive high-tech services — post and telecommunications (64); computer and related activities (72); research and development (73);

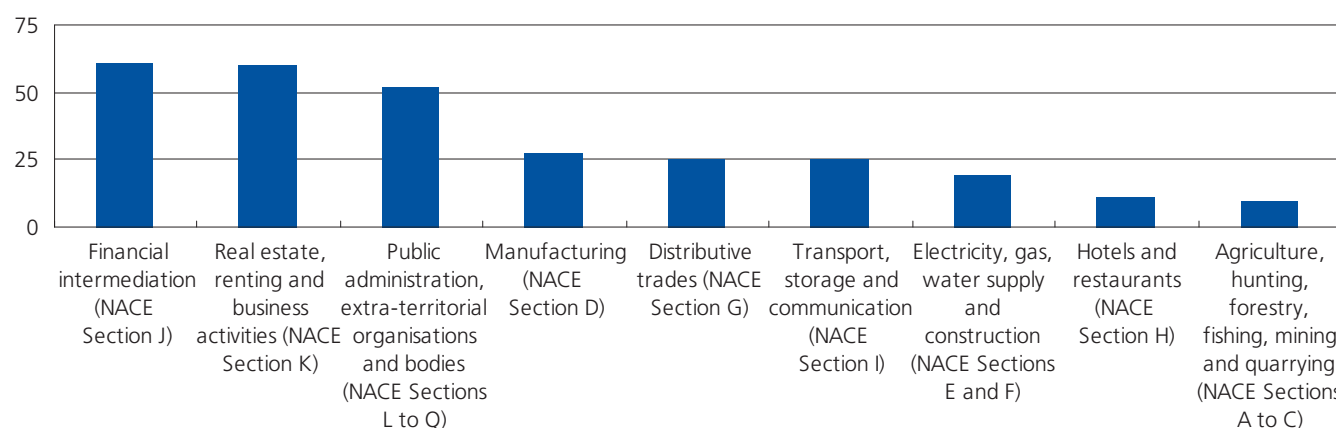
Knowledge-intensive market services (excl. financial intermediation and high-tech services) — water transport (61); air transport (62); real estate activities (70); renting of machinery and equipment without operator, and of personal and household goods (71); other business activities (74);

Knowledge-intensive financial services — financial intermediation, except insurance and pension funding (65); insurance and pension funding, except compulsory social security (66); activities auxiliary to financial intermediation (67);

Other knowledge-intensive services — education (80); health and social work (85); recreational, cultural and sporting activities (92).



**Figure 9.4: Human resources working in science and technology occupations, breakdown by activity, EU-25, 2004**  
(% of sectoral employment)



A human resource in science and technology (HRST) is defined according to the 'Canberra manual' as a person fulfilling one of the following conditions: successfully completed education at third level in S & T field of study; not formally qualified as above, but employed in S & T occupation where the above qualification is normally required.

### EXPENDITURE

R & D expenditure is a key indicator for tracing R & D developments: the basic measure is intramural expenditure, in other words, all expenditures for R & D that are performed within a statistical unit or sector of the economy, whatever the source of the funds. Among those indicators available, R & D intensity (which is defined as R & D expenditure relative to GDP) is the most frequently used for international comparisons of relative R & D efforts.

R & D intensity for the EU-25 showed a positive evolution in the six years up to 2003. However, when compared with the United States and Japan, the EU lags behind. This is mainly due to the differences observed in the business enterprise sector, where expenditure in the EU is considerably lower than in competing countries. Among the Member States, the highest R & D intensity was recorded in Finland and Sweden, the only Member States where R & D intensity exceeded the 3 % level set by the Lisbon strategy.

Government budget appropriations or outlays for research and development (GBAORD) are the amount governments allocate towards R & D activities. Comparisons of GBAORD across countries give an impression of the relative importance attached to state-funded R & D. GBAORD statistics complement the *ex post* figures on government-financed gross expenditure on research and development (GERD) and, when broken down by socioeconomic objective, underline the domains governments believe to be important for current and future policy action.

Gross domestic expenditure on R & D (GERD) in the EU-25 was equivalent to 1.9 % of GDP in 2005; this proportion rose to over 3 % in just two of the Member States, namely, Finland and Sweden (where R & D expenditure made by the business enterprise sector was considerably higher than in any of the other Member States). One structural weakness often cited in relation to Europe's research effort is the lack of business-financed research. Business enterprise R & D accounted for over 2 % of GDP in Japan and the United States in 2000, while the corresponding proportion for the EU-25 in 2004 was 1.2 %.

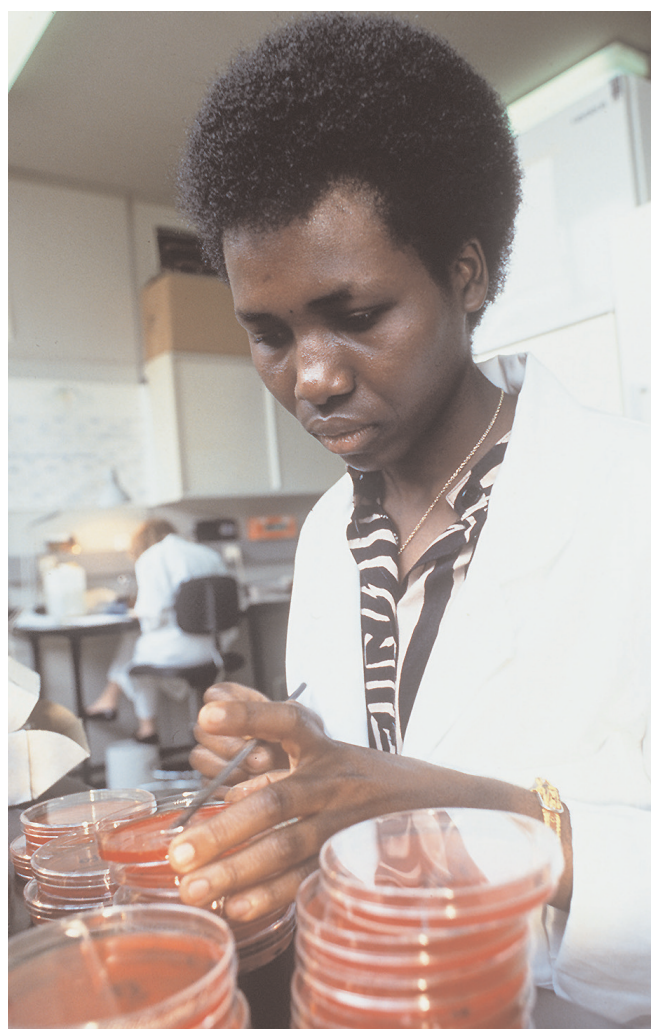


Table 9.5: Gross domestic expenditure on R &amp; D

(% of GDP)



	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
		(1)	(2)	(3)	(4)		(5)		(6)		(7)
<b>EU-25</b>	:	1.9	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9
<b>EU-15</b>	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0
<b>Euro area</b>	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
<b>Belgium</b>	1.7	1.7	1.8	1.9	1.9	2.0	2.0	2.1	2.0	1.9	1.9
<b>Czech Republic</b>	:	1.0	1.0	1.1	1.2	1.2	1.2	1.2	1.2	1.3	1.3
<b>Denmark</b>	:	1.8	1.9	1.9	2.1	2.1	2.3	2.4	2.6	2.6	2.6
<b>Germany</b>	2.2	2.2	2.2	2.2	2.3	2.4	2.5	2.5	2.5	2.5	2.5
<b>Estonia</b>	:	:	:	:	0.6	0.7	0.6	0.7	0.8	0.8	0.9
<b>Greece</b>	:	0.5	:	0.5	:	0.7	:	0.6	:	0.6	0.6
<b>Spain</b>	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.1	1.1
<b>France</b>	2.3	2.3	2.3	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2
<b>Ireland</b>	1.3	1.4	1.3	1.3	1.2	1.2	1.1	1.1	1.1	1.2	1.2
<b>Italy</b>	1.1	1.0	1.0	1.1	1.1	1.0	1.1	1.1	1.2	1.1	:
<b>Cyprus</b>	:	:	:	:	0.2	0.2	0.3	0.3	0.3	0.4	0.4
<b>Latvia</b>	0.4	0.5	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4
<b>Lithuania</b>	0.5	0.5	0.5	0.6	0.6	0.5	0.6	0.7	0.7	0.7	0.8
<b>Luxembourg</b>	:	:	:	:	:	:	1.7	:	:	1.8	1.8
<b>Hungary</b>	0.9	0.7	0.7	0.7	0.7	0.7	0.8	1.0	1.0	1.0	0.9
<b>Malta</b>	:	:	:	:	:	:	:	:	0.3	0.3	0.3
<b>Netherlands</b>	2.0	2.0	2.0	2.0	1.9	2.0	1.9	1.8	1.7	1.8	1.8
<b>Austria</b>	1.5	1.5	1.6	1.7	1.8	1.9	1.9	2.0	2.1	2.2	2.3
<b>Poland</b>	:	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6
<b>Portugal</b>	:	0.6	:	0.6	:	0.7	:	0.9	0.8	0.8	:
<b>Slovenia</b>	1.8	1.6	1.4	1.3	1.4	1.4	1.4	1.6	1.5	1.5	1.6
<b>Slovakia</b>	0.9	0.9	0.9	1.1	0.8	0.7	0.7	0.6	0.6	0.6	0.5
<b>Finland</b>	2.3	2.3	2.5	2.7	2.9	3.2	3.4	3.4	3.4	3.5	3.5
<b>Sweden</b>	:	3.4	:	3.6	3.6	3.7	:	4.3	:	4.0	3.7
<b>United Kingdom</b>	2.1	2.0	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8
<b>Bulgaria</b>	0.9	0.6	0.5	0.5	0.6	0.6	0.5	0.5	0.5	0.5	0.5
<b>Croatia</b>	:	:	:	:	:	:	:	:	1.1	1.1	:
<b>Romania</b>	:	:	:	:	0.5	0.4	0.4	0.4	0.4	0.4	0.4
<b>Turkey</b>	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.7	0.7	:	:
<b>Iceland</b>	1.4	1.6	:	1.9	2.1	2.4	2.8	3.1	3.1	3.0	3.0
<b>Norway</b>	:	1.7	:	1.6	:	1.7	:	1.6	1.7	1.8	1.6
<b>Switzerland</b>	:	:	:	:	:	:	2.6	:	:	:	:
<b>Japan</b>	2.6	2.7	2.8	2.8	3.0	3.0	3.0	3.1	3.1	3.2	:
<b>United States</b>	2.4	2.5	2.5	2.6	2.6	2.6	2.7	2.7	2.7	2.6	:

(1) Break in series, the Czech Republic.

(2) Break in series, Lithuania, Bulgaria and Japan.

(3) Break in series, Italy.

(4) Break in series, United States.

(5) Break in series, France.

(6) Forecast, Iceland.

(7) Forecast, Belgium and Luxembourg.

GERD (gross domestic expenditure on R & D). Research and experimental development comprises creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society and the use of this stock of knowledge to devise new applications; R & D is an activity where there are significant transfers of resources between units, organisations and sectors and it is important to trace the flow of R & D funds.



Table 9.6: Research and development expenditure by sector

(% of GDP)

TSC00001

	Business enterprise sector		Government sector		Higher education sector	
	2000	2004 (1)	2000 (2)	2004 (3)	2000 (2)	2004 (3)
<b>EU-25</b>	1.23	1.22	0.26	0.24	0.39	0.41
<b>EU-15</b>	1.26	1.26	0.26	0.24	0.40	0.43
<b>Euro area</b>	1.21	1.21	0.26	0.26	0.41	0.41
<b>Belgium</b>	1.45	1.32	0.13	0.15	0.41	0.43
<b>Czech Republic</b>	0.74	0.81	0.31	0.27	0.18	0.19
<b>Denmark</b>	1.51	1.81	0.28	0.17	0.45	0.62
<b>Germany</b>	1.73	1.75	0.33	0.33	0.40	0.41
<b>Estonia</b>	0.14	0.36	0.14	0.12	0.33	0.42
<b>Greece</b>	:	0.17	:	0.12	:	0.28
<b>Spain</b>	0.49	0.58	0.14	0.17	0.27	0.32
<b>France</b>	1.34	1.36	0.37	0.36	0.40	0.41
<b>Ireland</b>	0.81	0.77	0.09	0.09	0.23	0.33
<b>Italy</b>	0.53	0.56	0.20	0.17	0.33	:
<b>Cyprus</b>	0.05	0.08	0.12	0.14	0.06	0.13
<b>Latvia</b>	0.18	0.19	0.10	0.08	0.17	0.15
<b>Lithuania</b>	0.13	0.16	0.25	0.19	0.22	0.41
<b>Luxembourg</b>	1.58	1.54	0.12	0.19	0.00	0.02
<b>Hungary</b>	0.35	0.37	0.21	0.26	0.19	0.22
<b>Malta</b>	:	0.10	:	0.02	:	0.18
<b>Netherlands</b>	1.11	1.02	0.27	0.25	0.53	0.50
<b>Austria</b>	:	:	:	:	:	:
<b>Poland</b>	0.24	0.17	0.21	0.23	0.21	0.19
<b>Portugal</b>	:	:	:	:	:	:
<b>Slovenia</b>	0.81	0.96	0.37	0.35	0.24	0.25
<b>Slovakia</b>	0.43	0.26	0.16	0.16	0.06	0.11
<b>Finland</b>	2.40	2.46	0.38	0.33	0.60	0.69
<b>Sweden</b>	:	2.75	:	0.12	:	0.86
<b>United Kingdom</b>	1.21	1.16	0.22	0.18	0.38	0.39
<b>Bulgaria</b>	0.11	0.12	0.36	0.34	0.05	0.05
<b>Croatia</b>	:	:	:	:	:	:
<b>Romania</b>	0.26	0.22	0.07	0.14	0.04	0.04
<b>Turkey</b>	0.21	:	0.04	:	0.39	:
<b>Iceland</b>	1.56	1.70	0.76	0.63	0.45	0.61
<b>Norway</b>	:	0.90	:	0.26	:	0.49
<b>Switzerland</b>	1.90	:	0.03	:	0.59	:
<b>Japan</b>	2.12	:	0.30	:	0.43	:
<b>United States</b>	2.03	:	0.19	:	0.37	:

(1) Forecast, Belgium and Luxembourg.

(2) Break in series, France.

(3) Forecast, Belgium.

R & D expenditures include all expenditures for R & D performed within the business enterprise sector (BERD) on the national territory during a given period, regardless of the source of funds. R & D expenditure is shown as a percentage of GDP (R & D intensity).

**Figure 9.5: Gross domestic expenditure on R & D by source of funds, 2003**

(% of total GERD)



(1) Not available.

(2) 2002.

GERD (gross domestic expenditure on R & D). Research and experimental development comprises creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society and the use of this stock of knowledge to devise new applications; R & D is an activity where there are significant transfers of resources between units, organisations and sectors and it is important to trace the flow of R & D funds.

## PATENTS

Patents reflect part of a country's inventive capacity to exploit knowledge and translate it into potential economic gains. In this context, indicators based on patent statistics are widely used as a measure of R & D output and serve to assess the inventive performance of countries, regions or industries. Patent data published in this section are provided by the European Patent Office (EPO), while data for the United States Patent and Trademark Office (USPTO) are provided by the OECD.

The data from the EPO refer to patent applications filed under the European Patent Convention or under the Patent Cooperation Treaty and designating the EPO for protection. Although not all applications are granted, each one still represents technical effort by the inventor and so is regarded as an appropriate indicator of innovative potential. EU-25 patent applications to the EPO increased significantly during the 1990s. However, the steady upward trend reached a peak with 60 800 patent applications in 2001, followed by a slight decline in 2002, before the number of applications was halved in 2003 to just over 30 800 (hence, returning to levels last recorded in the early 1990s). Patent applications to the EPO from the United States numbered almost 20 700 in 2003, while the level of applications from Japan was just over 13 200.

Among the Member States, Germany had the highest number of patent applications to the EPO, some 12 900 in 2003 (which was almost 42 % of the EU-25 total). In relative terms, Germany was also the Member State with the highest number of patent applications per million inhabitants (156), followed by Finland (143) and then Sweden (137); although this rate was below that recorded by Switzerland (222 applications to the EPO per million inhabitants in 2003).

Finland stood out as the Member State that was particularly specialised in high-technology patents (mainly communications-related, but also computer and automated business equipment-related). Around 40 % of all Finish patent applications to the EPO were for high-technology patents in 2003, while the ratio of high-technology patent applications per million inhabitants stood at 58 (slightly more than twice the rate in Sweden, the next highest figure among the Member States).

**Table 9.7: Patent applications to the European Patent Office (EPO)**

(number of applications per million inhabitants)

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	Total patent applications to the EPO			High-technology patent applications to the EPO		
	2000	2001	2002	2000	2001	2002
<b>EU-25</b>	134.7	134.5	:	26.8	27.0	:
<b>EU-15</b>	159.9	159.5	:	31.9	32.1	:
<b>Belgium</b>	143.5	135.4	140.8	23.7	24.3	26.5
<b>Czech Republic</b>	10.4	11.3	12.0	0.7	0.9	0.8
<b>Denmark</b>	220.9	220.7	217.5	46.8	47.9	39.2
<b>Germany</b>	305.3	301.7	297.4	47.7	47.2	44.7
<b>Estonia</b>	9.8	10.1	7.1	1.8	3.4	1.8
<b>Greece</b>	6.6	8.9	9.9	1.4	1.4	2.0
<b>Spain</b>	26.1	28.5	30.5	3.7	4.1	3.9
<b>France</b>	143.0	145.5	144.2	30.3	32.0	30.8
<b>Ireland</b>	75.0	88.1	79.7	25.8	29.1	23.7
<b>Italy</b>	78.6	79.8	83.3	7.8	7.1	8.4
<b>Cyprus</b>	15.5	24.1	7.6	2.2	6.2	0.9
<b>Latvia</b>	6.4	4.7	5.5	0.8	:	1.1
<b>Lithuania</b>	2.5	2.2	2.8	0.5	0.5	:
<b>Luxembourg</b>	234.2	179.7	154.6	26.3	8.7	8.7
<b>Hungary</b>	20.0	17.9	19.0	5.0	3.9	2.7
<b>Malta</b>	11.8	16.5	11.8	:	:	:
<b>Netherlands</b>	244.5	278.7	244.3	98.5	98.5	68.4
<b>Austria</b>	172.7	173.2	183.9	24.4	24.4	26.9
<b>Poland</b>	3.1	3.1	4.7	0.4	0.4	0.6
<b>Portugal</b>	5.8	5.5	4.8	0.9	0.9	0.4
<b>Slovenia</b>	36.2	29.4	51.7	2.8	2.8	4.6
<b>Slovakia</b>	7.2	4.2	7.7	0.9	0.9	0.8
<b>Finland</b>	347.2	345.9	306.6	148.3	148.3	135.2
<b>Sweden</b>	367.4	322.7	290.4	77.5	77.5	63.4
<b>United Kingdom</b>	128.6	125.3	122.3	31.7	31.7	27.6
<b>Bulgaria</b>	2.8	3.5	4.6	0.4	0.4	0.7
<b>Croatia</b>	12.2	12.3	:	1.6	1.6	:
<b>Romania</b>	0.8	1.3	1.4	0.4	0.4	0.1
<b>Iceland</b>	154.0	123.9	180.9	43.3	43.3	42.9
<b>Liechtenstein</b>	847.5	933.3	849.8	48.1	48.1	44.7
<b>Norway</b>	142.3	132.0	134.8	22.4	22.4	19.8
<b>Switzerland</b>	425.6	435.5	411.7	61.6	61.6	54.1

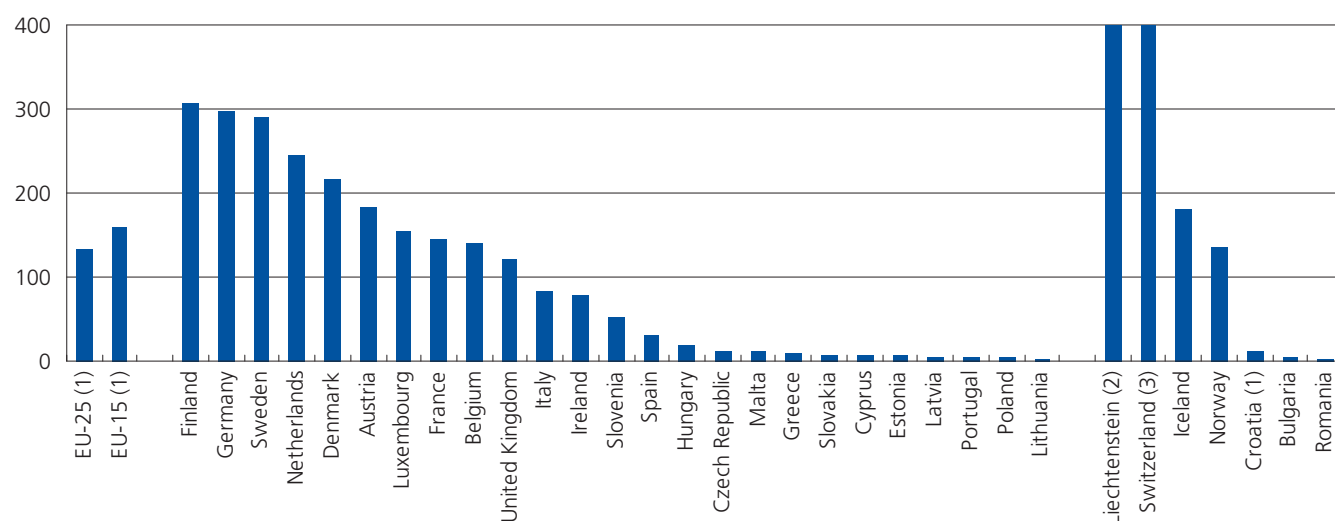
Data refer to applications filed directly under the European Patent Convention or to applications filed under the Patent Cooperation Treaty and designated to the EPO (Euro-PCT); patent applications are counted according to the year in which they were filed at the EPO; the definition of high-technology patents uses specific subclasses of the international patent classification (IPC) as defined in the trilateral statistical report of the EPO, JPO and USPTO.

**Figure 9.6: Patent applications to the European Patent Office (EPO), 2002**

(number of applications per million inhabitants)



TSC00009



(1) 2001.

(2) Y-axis broken, 849.8 applications per million inhabitants.

(3) Y-axis broken, 411.7 applications per million inhabitants.

Data refer to applications filed directly under the European Patent Convention or to applications filed under the Patent Cooperation Treaty and designated to the EPO (Euro-PCT); patent applications are counted according to the year in which they were filed at the EPO.

## INFORMATION SOCIETY

Statistics on the information society are vital in order to monitor the implementation of the eEurope 2005 action plan and Eurostat plays a pivotal role in this process. A further initiative, i2010, was taken as a follow-up to 2005 – seeking to further boost efficiency throughout the economy through wider use of ICTs.

Statisticians are well aware of the challenge that is posed by the rapid changes associated with the Internet and other new means of information and communication technology. As such, there has been a considerable degree of evolution in this area, as statistical tools have been adapted to satisfy new demands for data. Statistics within this domain are re-assessed on an annual basis in order to meet user needs and reflect the rapid pace of technological change. The data presented within this section are from a survey on information and communication technologies in households and by individuals and a survey on information and communication technologies in enterprises, both conducted by Eurostat.

## INTERNET ACCESS AND ICT EXPENDITURE

During the last decade, information and communication technologies (ICTs) have become widely available to the general public, in terms of accessibility as well as cost. In 2005, more than half (58 %) of all households in the EU-25 had a personal computer at home, and almost half (48 %) of all households had Internet access (of which, about half again had broadband access).

However, there remains a divide between users and non-users. This so-called '*digital divide*' has a number of origins: lack of infrastructure access (in remote regions), a lack of incentives to use ICTs, or a lack of computer literacy or skills (in particular among older generations).

One means of measuring the '*digital divide*' is to look at the ability to use ICTs. A relatively new module gathers information on skills in relation to a variety of issues, such as: level of computer skills, level of Internet skills, the way of obtaining e-skills and information on training courses in relation to the use of computers. For the use of computers, the 2005 data show that some 64 % of the EU-25 population aged 16 to 74 had at least basic skills as they had already carried out at least two computer related tasks. The share fell to only 22 % when considering persons who had carried out five or six computer related activities.





Governments are increasingly realising that broadband access to the Internet will be central to economic development. Widespread and affordable broadband access is essential to realising the potential of the knowledge-based and informed society. Broadband technologies offer users the possibility to rapidly transfer large volumes of data and keep their access line open. One of the main arguments presented for the need to increase broadband uptake in Europe is its importance for the development of e-commerce and e-skills. Available statistics show that a positive relationship exists between household broadband penetration and the use of the Internet to order products via the Internet.

E-commerce is defined by the number of individuals who buy over the Internet and the number of enterprises which sell over the Internet or other networks. Among the Member States there is a clear distinction between relatively high levels of take-up of e-commerce in some countries whereas in other countries the participation rates for e-commerce are much lower.

Although the 'digital divide' usually refers to a gap in participation between different groups of persons, the discussion can be expanded to a business environment. On average, 89 % of enterprises in the EU-25 had an Internet connection in 2005. Virtually all (99 %) large enterprises (defined as having 250 or more persons employed) were connected to the Internet. The rate of connection was a little lower (90 %) among small enterprises (defined as having between 10 and 49 employees).

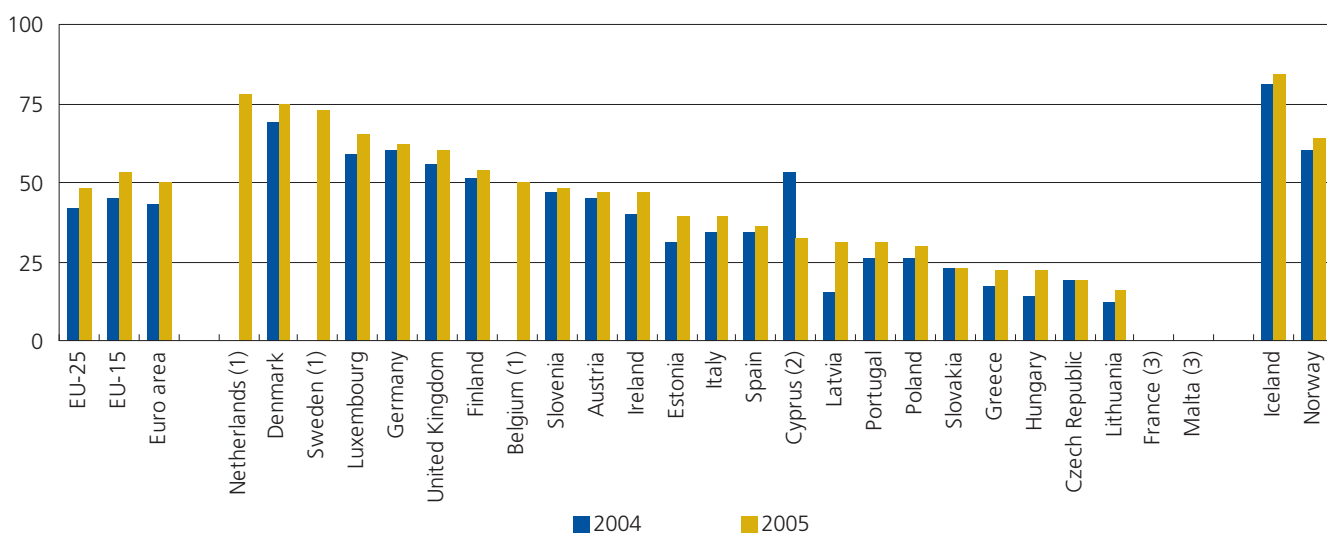
Online purchases by enterprises were particularly important in the United Kingdom, where about half (51 %) of all businesses purchased goods or services online in 2005. Rates were also



relatively high in Germany, Ireland and Sweden (all at 41 % in 2005). About 1 in 10 enterprises (12 %) in the EU also received orders online in 2005 (the highest rate of 32 % being in Denmark).

**Figure 9.7: Internet access of households**

(% of all households)



(1) Not available for 2004.

(2) Break in series: in 2004 household Internet access was measured by the technical capacity households had to access the Internet (users need not have a subscription to an ISP but just dial the number of the service - cytanetforall); in 2005 the definition was changed so only those households which accessed the Internet at least once during the first quarter of 2005 were taken into account.

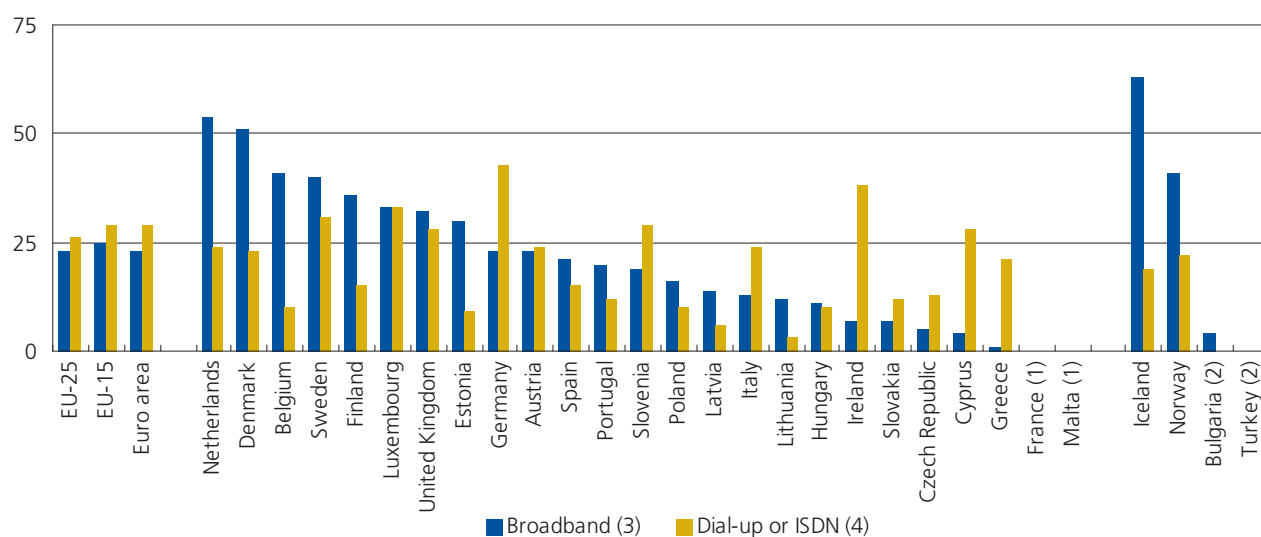
(3) Not available.

Percentage of households which have Internet access at home; all forms of Internet use are included; covers all households having at least one member in the age group 16 to 74 years.

**Figure 9.8: Internet access of households by type of connection, 2005**

(% of all households)

TSC00020



(1) Not available.

(2) 2004 for broadband; dial-up or ISDN not available.

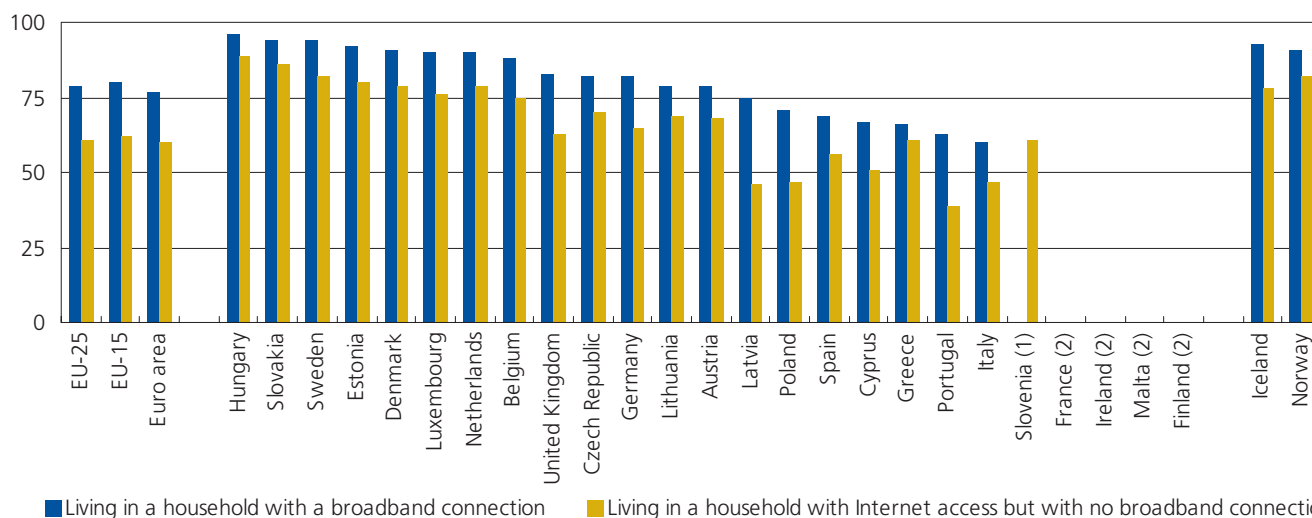
(3) DSL, ADSL, SHDSL.

(4) Connects the household via dial-up either through an analogue modem or ISDN.

The availability of broadband is measured by the percentage of households that are connectable to an exchange that has been converted to support xDSL technology, to a cable network upgraded for Internet traffic, or to other broadband technologies; it covers all households having at least one member in the age group 16 to 74 years.

**Figure 9.9: Individuals regularly using the Internet by type of connection, 2005**

(% of individuals aged 16 to 74)



(1) Broadband not available.

(2) Not available.

This indicator covers all individuals aged 16 to 74 who access the Internet, on average, at least once a week, within the last three months before the survey.

**Table 9.8: Place of Internet use by individuals, 2005**

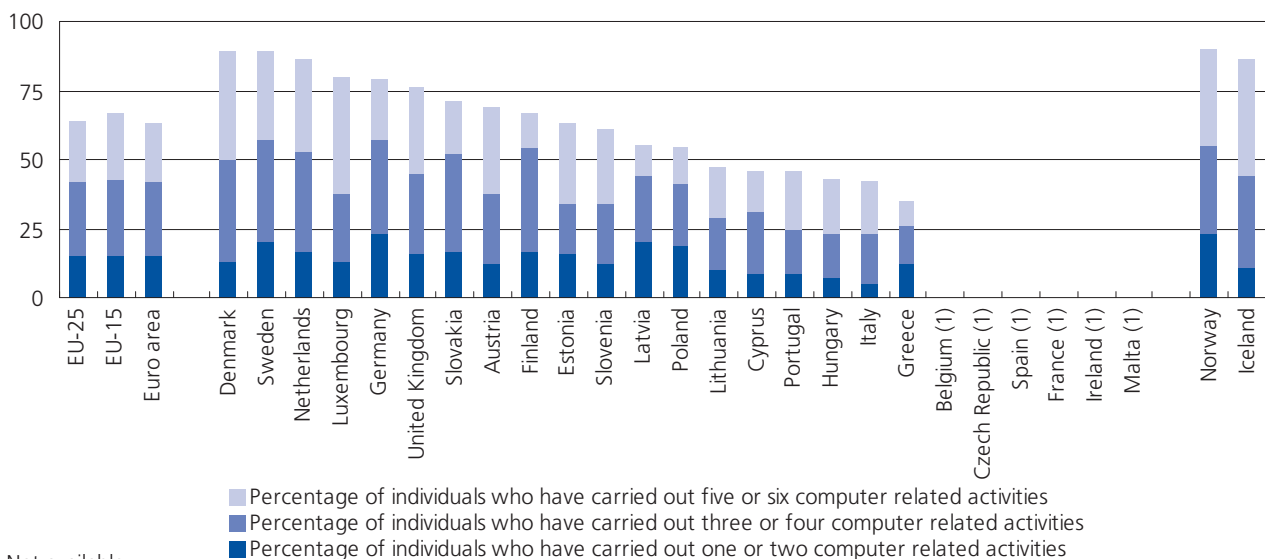
(% of individuals aged 16 to 74)

	Place of education	Home	Place of work (other than home)	Other places
EU-25	8	40	21	7
EU-15	8	44	23	7
Euro area	7	40	20	5
Belgium	5	47	18	3
Czech Republic	7	20	14	2
Denmark	11	72	37	6
Germany	9	57	20	5
Estonia	8	40	20	3
Greece	4	14	10	3
Spain	8	28	20	11
France	:	:	:	:
Ireland	4	26	17	3
Italy	4	24	16	4
Cyprus	5	22	14	2
Latvia	7	21	18	8
Lithuania	11	16	15	6
Luxembourg	10	65	26	3
Hungary	7	21	17	6
Malta	:	:	:	:
Netherlands	8	74	36	3
Austria	5	41	25	2
Poland	10	20	11	6
Portugal	8	20	15	5
Slovenia	7	35	23	6
Slovakia	11	20	27	12
Finland	:	56	38	:
Sweden	12	71	40	5
United Kingdom	10	55	31	16

Individuals who used the Internet in the last three months; multiple answers allowed, regardless of the device used or type of connection used; e.g. if a person uses a portable computer with a wireless connection at several locations, he or she should tick all those locations.

**Figure 9.10: Individuals' level of computer skills, 2005**

(% of individuals aged 16 to 74)

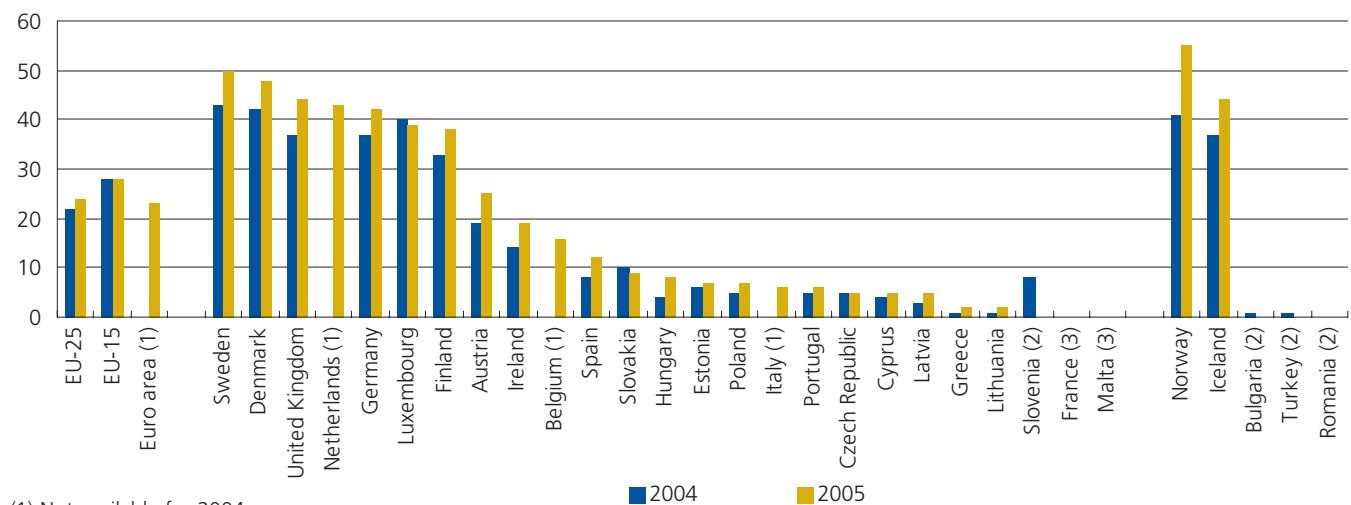


(1) Not available.

Percentage of individuals who have carried out the following computer related activities: used a mouse to launch programs such as an Internet browser or word processor; copied or moved a file or folder; used copy or cut and paste tools to duplicate or move information on screen; used basic arithmetic formulae to add, subtract, multiply or divide figures in a spreadsheet; compressed files; written a computer program using a specialised programming language

**Figure 9.11: Individuals who ordered goods or services over the Internet for private use in the last year**

(% of individuals aged 16 to 74)



(1) Not available for 2004.

(2) Not available for 2005.

(3) Not available.

**Table 9.9: Individuals using the Internet for interacting with public authorities, 2005**

(% of individuals aged 16 to 74)

TSC00018

	For obtaining information from public authorities websites	For downloading official forms	For sending filled forms
<b>EU-25</b>	20.7	10.5	6.1
<b>EU-15</b>	22.9	11.3	6.7
<b>Euro area</b>	22.2	11.6	6.6
<b>Belgium</b>	15.9	7.6	4.4
<b>Czech Republic</b>	3.3	2.4	1.4
<b>Denmark</b>	:	:	:
<b>Germany</b>	:	:	:
<b>Estonia</b>	29.0	17.5	16.6
<b>Greece</b>	4.7	1.8	3.2
<b>Spain</b>	22.5	12.5	6.0
<b>France</b>	:	:	:
<b>Ireland</b>	14.4	11.8	9.2
<b>Italy</b>	13.0	9.1	3.6
<b>Cyprus</b>	10.9	4.8	1.7
<b>Latvia</b>	12.2	4.9	5.0
<b>Lithuania</b>	11.3	6.6	5.6
<b>Luxembourg</b>	38.2	32.0	18.7
<b>Hungary</b>	15.1	12.3	7.3
<b>Malta</b>	:	:	:
<b>Netherlands</b>	40.7	21.8	20.4
<b>Austria</b>	24.9	11.1	12.3
<b>Poland</b>	10.7	5.7	2.6
<b>Portugal</b>	11.8	8.3	9.0
<b>Slovenia</b>	17.6	9.5	:
<b>Slovakia</b>	23.7	13.5	6.5
<b>Finland</b>	44.6	21.5	11.2
<b>Sweden</b>	48.7	30.7	21.4
<b>United Kingdom</b>	22.1	7.1	4.8
<b>Iceland</b>	50.3	29.3	19.9
<b>Norway</b>	46.4	23.8	20.6

**Table 9.10: Enterprises using the Internet for interacting with public authorities, 2005**

(% of enterprises)

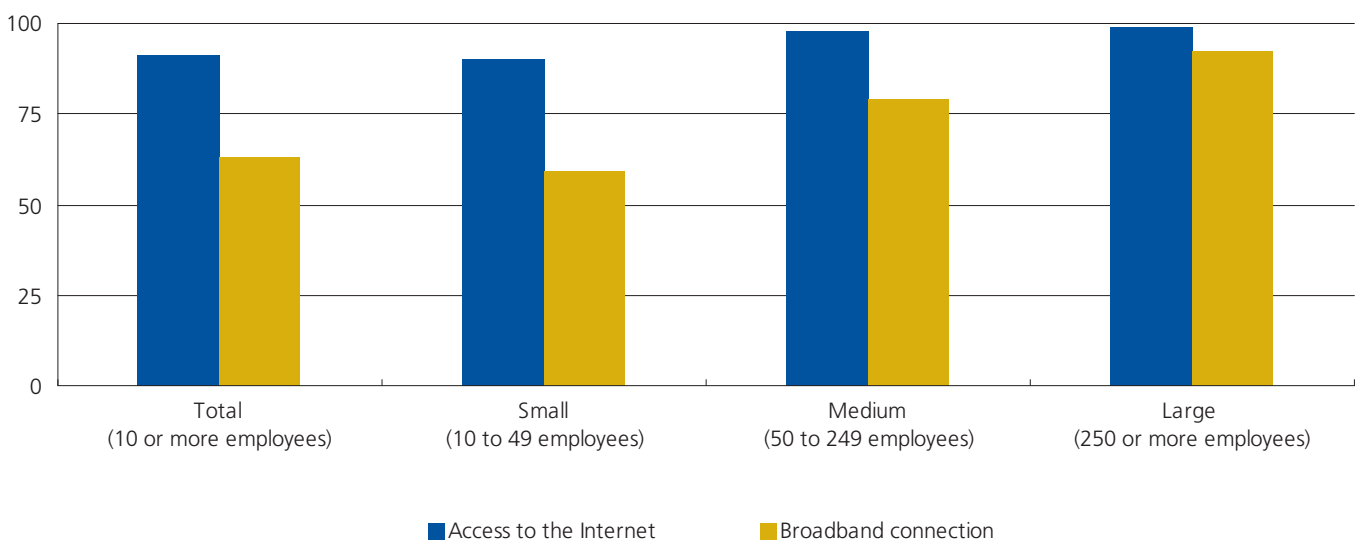
	For obtaining information	For obtaining forms	For returning filled in forms
<b>EU-25</b>	51	50	33
<b>EU-15</b>	50	49	31
<b>Euro area</b>	51	50	33
<b>Belgium</b>	57	44	33
<b>Czech Republic</b>	73	65	32
<b>Denmark</b>	81	77	56
<b>Germany</b>	37	36	24
<b>Estonia</b>	66	62	50
<b>Greece</b>	72	69	56
<b>Spain</b>	52	51	35
<b>France</b>	:	:	:
<b>Ireland</b>	64	64	42
<b>Italy</b>	66	64	29
<b>Cyprus</b>	39	23	9
<b>Latvia</b>	32	30	15
<b>Lithuania</b>	67	69	52
<b>Luxembourg</b>	:	:	:
<b>Hungary</b>	63	61	35
<b>Malta</b>	66	60	45
<b>Netherlands</b>	52	51	44
<b>Austria</b>	57	69	41
<b>Poland</b>	52	47	60
<b>Portugal</b>	52	53	52
<b>Slovenia</b>	69	61	45
<b>Slovakia</b>	50	51	16
<b>Finland</b>	88	87	71
<b>Sweden</b>	78	77	48
<b>United Kingdom</b>	37	34	19

Enterprises with 10 or more full-time employees; enterprises have their main activity in NACE Sections D, F, G, I and K or NACE Groups 55.1, 55.2, 92.1 and 92.2.

**Figure 9.12: Internet access and broadband connection of enterprises, EU-25, 2005**

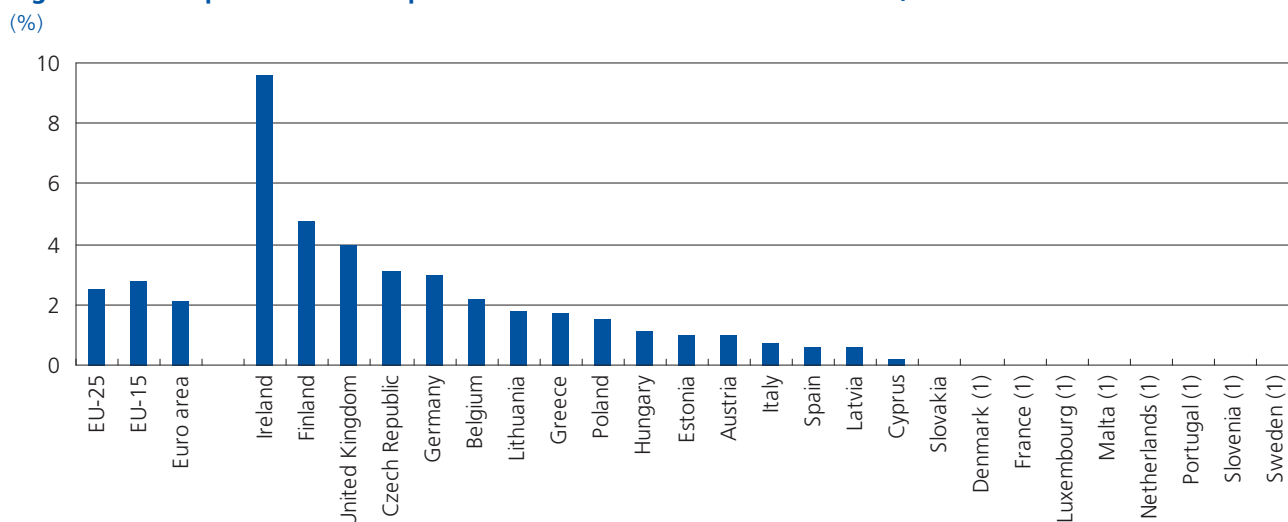
(% of enterprises)

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Enterprises with 10 or more full-time employees; enterprises have their main activity in NACE Sections D, F, G, I and K or NACE Groups 55.1, 55.2, 92.1 and 92.2; all forms of Internet use are included; broadband is measured by the percentage of enterprises connected to an exchange that has been converted to support xDSL technology, to a cable network upgraded for Internet traffic, or to other broadband technologies.

**Figure 9.13: Proportion of enterprises' total turnover from e-commerce, 2005**

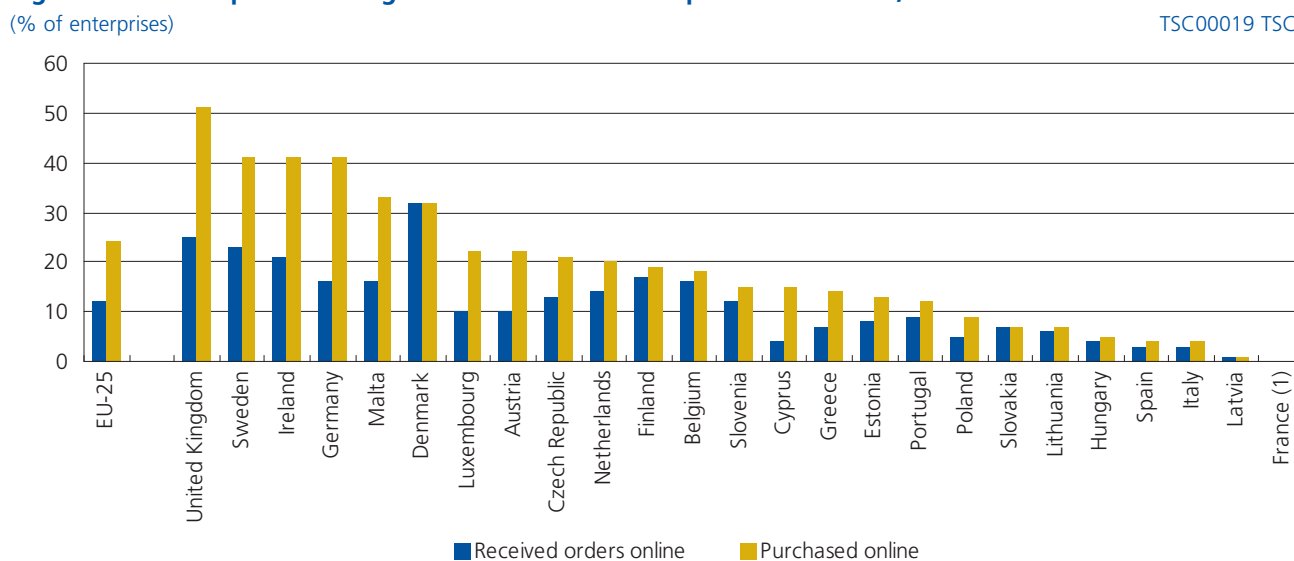


(1) Not available.

The indicator is calculated as the enterprises' receipts from sales through the Internet as a percentage of the total turnover; sales through other networks are not included, leaving out, for instance, EDI-based sales; enterprises with 10 or more full-time employees are covered; the year given relates to the survey year; the e-commerce data relate to the year prior to the survey; the enterprises have their main activity in NACE Sections D, F, G, I and K or NACE Groups 55.1, 55.2, 92.1 and 92.2.

**Figure 9.14: Enterprises having received orders/made purchases online, 2005**

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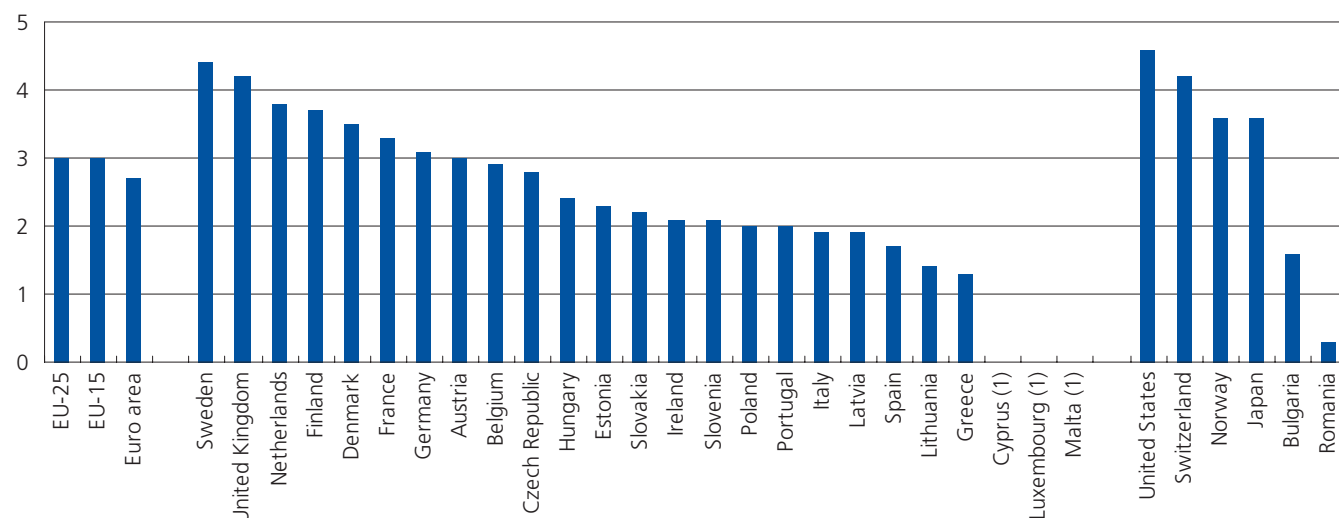


(1) Not available.

The indicator covers online selling/purchasing via Internet and EDI or other networks within the previous year (only enterprises selling/purchasing more than 1 % online are included); enterprises with 10 or more full-time employees are covered; the enterprises have their main activity in NACE Sections D, F, G, I and K or NACE Groups 55.1, 55.2, 92.1 and 92.2.


**Figure 9.15: Information technology (IT) expenditure, 2004**

(% of GDP)



(1) Not available.

Source: European Information Technology Observatory (EITO)

Annual data on expenditure for IT hardware, equipment, software and other services as a percentage of GDP.

## TELECOMMUNICATIONS

The liberalisation of telecommunication markets has led to considerable reductions in prices within recent years. This may, in part, reflect the introduction of competition into a number of markets that were previously the domain of incumbent, monopoly suppliers, as well as reflecting technological changes that have increased capacity and made it possible to communicate not only by voice, but also over the Internet.

Main telephone lines are the traditional way of connecting to communication networks. They are usually used for voice telephony, but may also be used for accessing the Internet via a modem and dial-up connection. The rapid growth of the more powerful means to access the Internet (broadband) and mobile communications eroded the market for traditional fixed telecommunication networks.

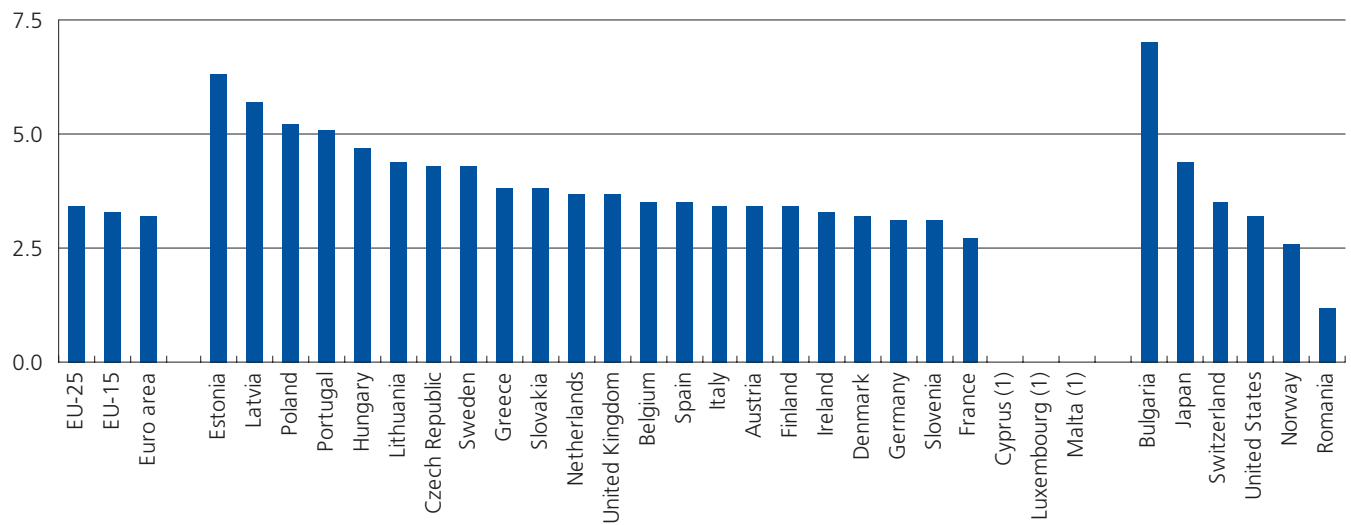
Mobile phones were first introduced into Europe during the early 1980s. Constrained by weight and power supply requirements, they were initially confined to cars. As mobile phones became lighter, cheaper and technically more advanced, the market started to take off, especially in the second half of the 1990s.

From 1991 to 2004, the number of mobile phone subscribers increased continuously. In 1993, the rate of subscriptions per 100 inhabitants was under 10 in most European countries, while by 2004 it often stood close to 100, and in some countries like the Czech Republic, Sweden and Luxembourg even surpassed this (note that one person may have more than one subscription, privately or for professional use). In most of the 10 Member States that joined the EU in 2004, penetration rates for mobile subscriptions were just as high as the other Member States.



**Figure 9.16: Telecommunications expenditure, 2004**

(% of GDP)



(1) Not available.

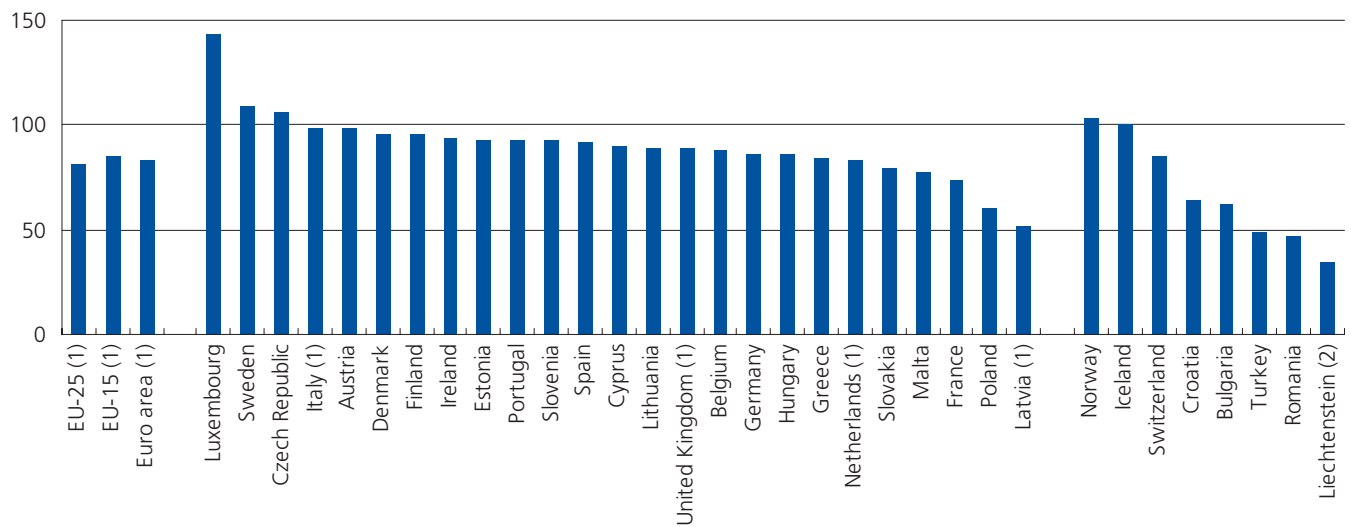
Source: European Information Technology Observatory (EITO)

Annual data on expenditure for telecommunication hardware, equipment, software and other services as a percentage of GDP.

**Figure 9.17: Mobile phone subscriptions, 2004**

(average number of subscriptions per 100 inhabitants)

TSC00014



(1) 2003.

(2) 2002.

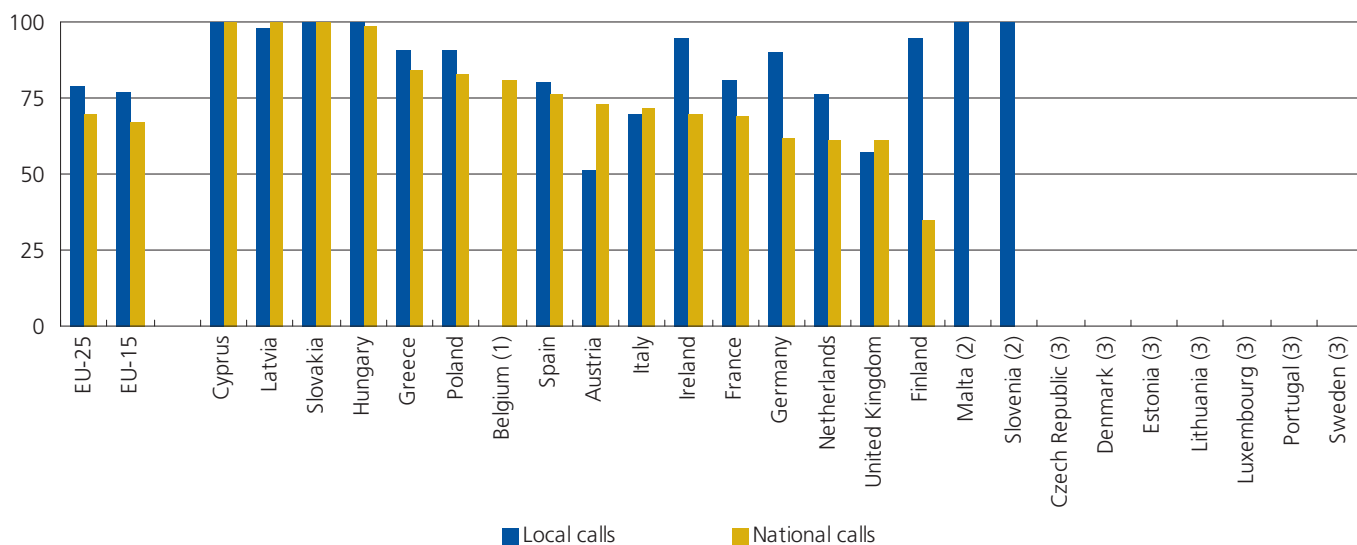
This indicator shows the number of subscriptions to public mobile telecommunication systems using cellular technology, related to the population; the total number of mobile subscriptions in the country is divided by the number of inhabitants of the country and multiplied by 100; active pre-paid cards are treated as subscriptions; one person may have more than one subscription.





**Figure 9.18: Market share of the incumbent in fixed telecommunications, 2003**

(% of total market)

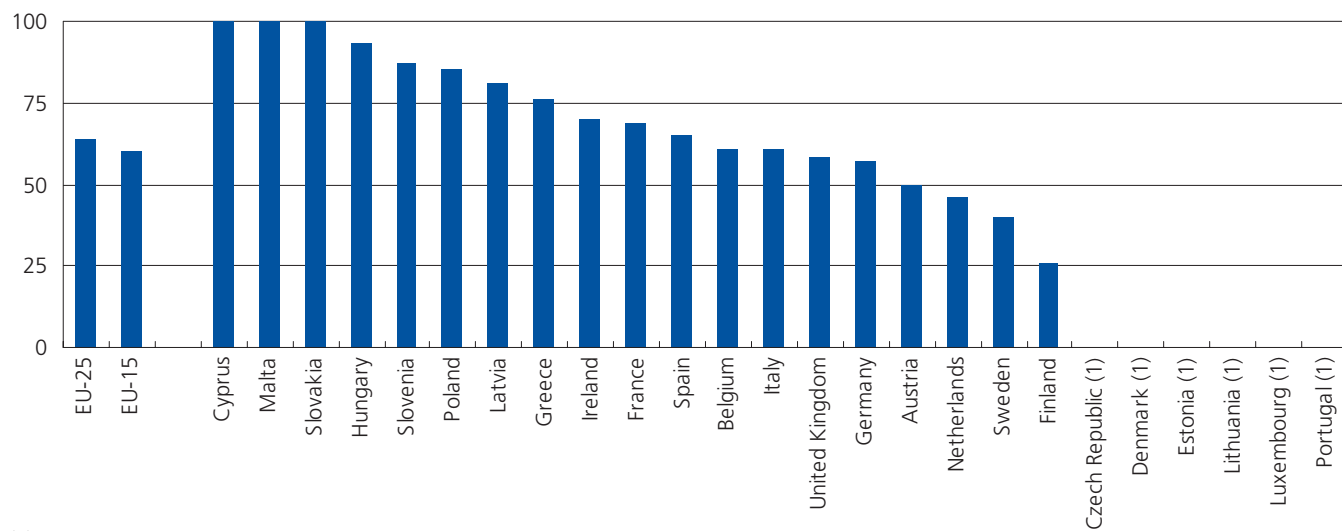


- (1) Local calls not available.
- (2) National calls not available.
- (3) Not available.

The incumbent is defined as the enterprise active on the market just before liberalisation; the market share is calculated as the share of the incumbent's retail revenues of the total market.

**Figure 9.19: Market share of the incumbent in fixed telecommunications, international calls, 2003**

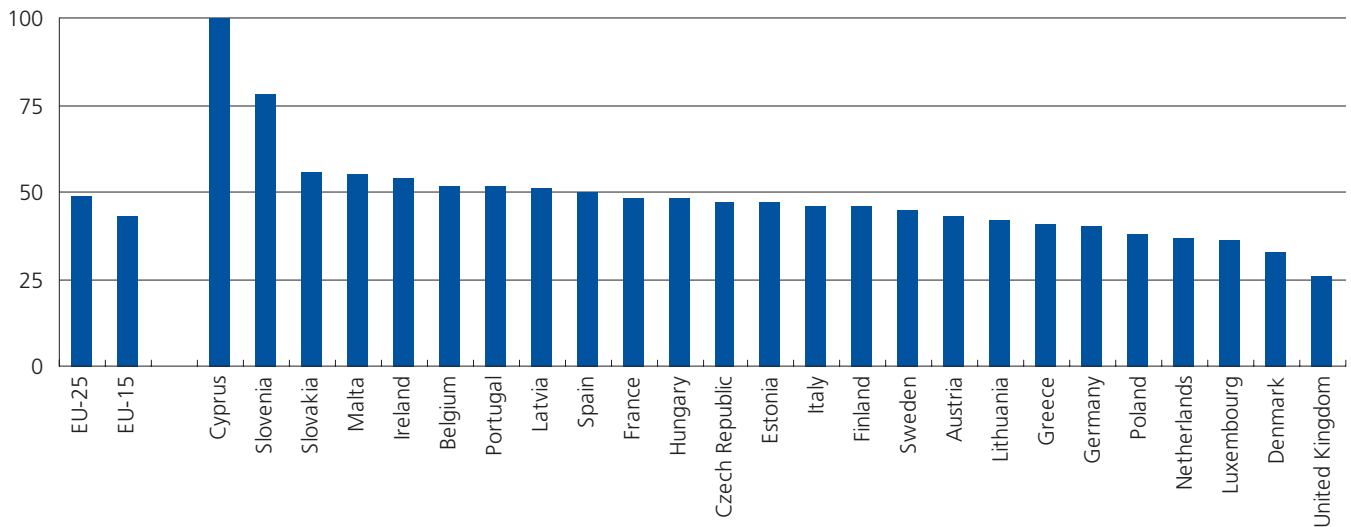
(% of total market)



- (1) Not available.

**Figure 9.20: Market share of the leading operator in mobile telecommunications, 2004**

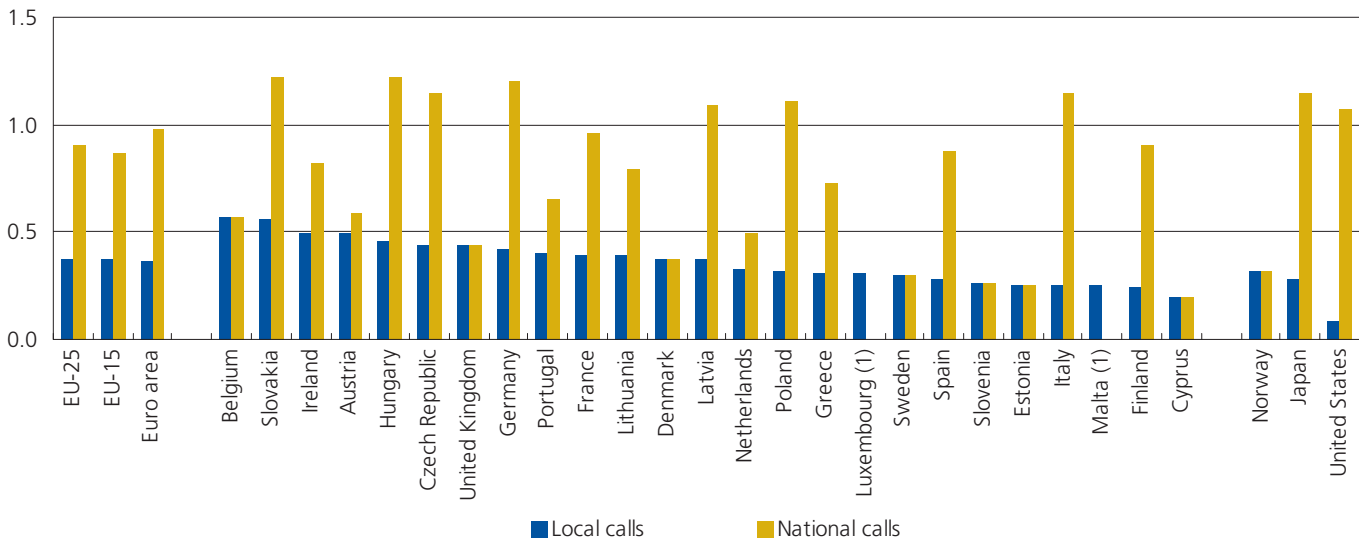
(% of total market)



The market share of the leading operator is calculated on the basis of the estimates of the number of mobile subscribers; the share of the leading operator of all subscriptions in mobile telecommunication is given.

**Figure 9.21: Price of fixed telecommunications, 2004**

(EUR per 10-minute call)



(1) No price for national calls (all calls considered as local).

The prices refer to August each year; normal tariffs without special rates are used; the price in euro of a 10-minute call at 11 a.m. on a weekday (including VAT) for a local call (3 km); national call (200 km).

**Table 9.11: Price of fixed telecommunications**

(EUR per 10-minute call)



	Local calls			National calls			Calls to the United States		
	2000	2003	2004	2000	2003	2004	2000	2003	2004
<b>EU-25</b>	:	0.38	0.37	1.31	1.04	0.90	:	2.88	2.07
<b>EU-15</b>	0.40	0.39	0.37	1.33	1.01	0.87	3.10	2.13	1.85
<b>Euro area</b>	0.36	0.36	0.36	1.40	1.01	0.98	3.06	1.90	1.83
<b>Belgium</b>	0.50	0.56	0.57	1.74	0.56	0.57	5.95	1.94	1.98
<b>Czech Republic</b>	0.43	0.35	0.44	1.29	2.08	1.15	:	2.87	2.87
<b>Denmark</b>	0.41	0.37	0.37	0.54	0.37	0.37	4.72	2.39	2.39
<b>Germany</b>	0.43	0.42	0.42	1.24	1.22	1.20	2.45	1.23	1.23
<b>Estonia</b>	0.14	0.25	0.25	0.71	0.25	0.25	10.26	2.38	2.41
<b>Greece</b>	0.31	0.31	0.31	1.40	0.77	0.73	3.26	2.95	2.91
<b>Spain</b>	0.28	0.28	0.28	1.85	0.88	0.88	4.25	1.53	1.53
<b>France</b>	0.42	0.39	0.39	1.20	0.96	0.96	2.97	2.34	2.24
<b>Ireland</b>	0.51	0.51	0.49	0.94	0.82	0.82	2.92	1.90	1.90
<b>Italy</b>	0.25	0.25	0.25	1.72	1.22	1.15	2.79	2.12	2.12
<b>Cyprus</b>	0.08	0.20	0.20	0.62	0.20	0.20	3.79	1.00	0.79
<b>Latvia</b>	0.37	0.37	0.37	1.09	1.09	1.09	6.23	6.26	6.25
<b>Lithuania</b>	0.26	0.35	0.39	1.07	1.16	0.79	11.96	8.08	4.07
<b>Luxembourg</b>	0.37	0.31	0.31	-	-	-	2.06	1.44	1.37
<b>Hungary</b>	0.39	0.46	0.46	1.38	1.22	1.22	4.81	3.32	2.72
<b>Malta</b>	:	0.28	0.25	-	-	-	:	12.61	1.81
<b>Netherlands</b>	0.30	0.33	0.33	0.42	0.49	0.49	0.78	0.85	0.85
<b>Austria</b>	0.69	0.56	0.49	2.30	0.67	0.59	4.32	3.77	1.90
<b>Poland</b>	0.32	0.32	0.32	1.33	1.11	1.11	9.60	9.60	3.33
<b>Portugal</b>	0.23	0.31	0.40	1.28	0.96	0.65	3.68	2.52	2.52
<b>Slovenia</b>	0.17	0.26	0.26	0.17	0.26	0.26	:	1.75	1.75
<b>Slovakia</b>	0.30	0.39	0.56	1.45	1.10	1.22	8.39	2.86	2.85
<b>Finland</b>	0.22	0.23	0.24	0.87	0.88	0.90	5.68	4.84	4.77
<b>Sweden</b>	0.30	0.30	0.30	0.30	0.30	0.30	1.14	1.14	1.09
<b>United Kingdom</b>	0.58	0.58	0.44	1.16	1.16	0.44	3.46	3.46	2.05
<b>Norway</b>	0.33	0.34	0.32	0.33	0.34	0.32	1.21	0.86	0.82
<b>Japan</b>	0.33	0.28	0.28	2.46	1.15	1.15	4.91	4.91	4.91
<b>United States</b>	0.09	0.09	0.08	0.45	0.81	1.07	-	-	-