

# Science, technology and innovation in Europe

## Statistics in focus

### SCIENCE AND TECHNOLOGY

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Author

August GÖTZFRIED

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Table 1: GERD per capita (PPS) and annual average Growth rate (2001-2003), all sectors, in the EU-25 Member States, EEA countries, Switzerland, Candidate countries, Japan and the United States, 2003

Sector:	TOTAL		Sector:	TOTAL	
	GERD per capita	AAGR (2001-2003)		GERD per capita	AAGR (2001-2003)
EU-25	409	2.7	NL	500	2.7
BE	613	6.2	AT	594	4.8
CZ	205	9.2	PL	58	-3.8
DK	716	5.2	PT	133	-2.4
DE	603	1.2	SI	261	2.5
EE	88	11.7	SK	69	1.3
EL	101	3.4	FI	830	2.0
ES	237	12.7	SE	1 060	12.4
FR	552	1.1	UK	479	5.9
IE	339	3.5	BG	34	8.9
IT	279	5.9	RO	27	8.8
CY	64	14.1	TR	:	:
LV	38	5.3	IS	824	6.9
LT	72	9.8	NO	570	2.7
LU	780	:	CH	715	:
HU	126	5.1	JP	673	-4.8
MT	30	:	US	825	10.6

Source: Eurostat

Exceptions to the reference year 2003: IT, UK and IS: 2002; EL, NL and SE: 2001; LU and CH: 2000; JP and US: 1999

Exceptions to the reference period 2001-2003: IT, UK and IS: 2000-2002; EL, NL and SE: 1999-2001; JP and US: 1997-1999

Provisional data: BE, CZ, EE, IE, CY, LT, AT, PT, FI, NO

Break in series: EE, FR and PL

Estimation: EU-25, DE, FR and SI

AAGR: Annual average growth rate

GERD: Gross Domestic Expenditure on R&D

GERD per capita: ratio representing R&D expenditure divided by the population

### Main findings

- In 2003, the highest GERD per capita among the EU Member States was observed in Sweden and Finland at 1 060 and 830 PPS respectively.
- In 2003, 54 % of the R&D personnel in the EU-25 expressed in full time equivalent (FTE) worked in Germany, France and the United Kingdom. The highest R&D personnel increases over the previous year were observed in Malta (76 %), Greece (14 %) and Spain (13 %).
- Germany, the leading Member State, hosted 267 000 researchers in 2003. The highest annual average growth rates between 2001 and 2003 were in Cyprus (17.5 %), Greece (16.3 %) and Denmark (13.7 %). Iceland (2.0 %) and Finland (1.9 %) have the highest shares of researchers in relation to the active population.
- The top three Member States for the percentage of graduates as a share of the population aged 20-29 in 2002 were Poland (7.8 %), the United Kingdom (7.7 %) and France (7.1 %).
- Over 4 % of turnover is dedicated to innovation expenditure in Germany (5.0 %) and Cyprus (4.3 %) in the manufacturing sector whereas the figure for the Russian Federation (6.6 %) stands out in the service sector.
- In 2003, most high tech exports expressed as a share of total exports were noted in Malta (55 %) far ahead of Ireland (30 %) and Luxembourg (29 %).



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## Highest GERD per capita in Sweden and Finland

In 2003, Sweden and Finland had the highest GERD per capita (in PPS) among the EU Member States. At 1 060 and 830 PPS respectively, their R&D expenditure per head of the population represented more than two times the EU-25 (409) average. Outside the EU-25, two countries, Iceland and the United States, reached the similar values (Table 1).

The top of the ranking is mainly composed of smaller Member States like Luxembourg, Denmark or Belgium. Large Member States follow with a GERD per capita level that is above the EU-25 average. Germany (603) comes ahead, before France (552) and the UK (479).

The new Member States are all below the EU-25 average. In 2003, the highest R&D expenditures per head of the population were recovered in Slovenia (261), the Czech Republic (205) and Hungary (126).

The situation is different with countries' GERD per capita annual average growth rate (AAGR) measured between 2001 and 2003. The majority of the top 10 countries belong to the group of the new Member States or candidate countries: Cyprus, Estonia, Lithuania, the Czech Republic, Bulgaria and Romania. The highest growth rates were however recorded in Cyprus (14.1%), which preceded Spain (12.7%) and Sweden (12.4%).

The AAGR for the large countries are more dispersed. Very high values are shown in the United States (10.6%), Italy and the United Kingdom (5.9% each), whereas the increases are rather low for Germany (1.2%) and France (1.1%) or even negative for Japan (-4.8%).

## More than half of the R&D personnel in the EU-25 work in 3 countries

In 2003 in the EU-25, 54% of the R&D personnel in full time equivalent (FTE) worked in Germany, France and the United Kingdom (Table 2). However, these countries come far behind China – where more than one million persons were working in R&D – the Russian Federation and Japan. The whole EU-25 employs however twice as much personnel in R&D as China. All these countries saw their number of R&D personnel increase over the last year, except Japan and the Russian Federation where decreases of 3.90% and 1.15% respectively were shown. In terms of annual growth, the highest R&D personnel increases took place in Malta (76%), Greece (14%), Spain (13%), Iceland (10%) and China (8%).

At a regional level, R&D personnel are generally concentrated in one region within a country. In 13 countries, the leading region accounts for more than 30% of the national R&D personnel. Only Germany, Spain, Italy and the Netherlands show a lower concentration pattern.

Exceptions to the reference year 2003 (country level):

FR, IT, HR, TR, JP and CN: 2002; NL, SE and IS: 2001; LU, MT and CH: 2000; EL: 1999; UK: 1993

Exceptions to the reference year 2002 (regional level):

DE, NL, PL and TR: 2001; IT: 2000; SE: 1999; AT: 1998; EL: 1997

Exceptions to the reference period 2002-2003 (country level):

FR, TR, JP and CN: 2001-2002; IT: AAGR, 2000-2002; NL and IS: 2000-2001; SE: AAGR, 1999-2001; MT: 1999-2000; EL: AAGR, 1997-1999; UK: 1992-93

Exceptions to the reference period 2001-2002 (regional level): BE and TR: AAGR, 1999-2001; IT: AAGR, 1996-2000; SE: AAGR, 1997-1999

AGR: Annual growth rate

AAGR: Annual average growth rate

Table 2: R&D personnel in FTE and annual growth rate in the EU-25 Member States, EEA countries, Switzerland, Candidate countries, China and Japan, national data: 2003, regional data from: 2002

Sector:		TOTAL		
Country	Region – NUTS 2	Countries at NUTS 2 level	FTE (National data: 2003 Regional data: 2002)	Annual growth rate (AGR)
EU-25			2 049 942	1.14
BE - Belgium			60 047	5.14
CZ - Czech Republic			27 957	7.39
	Praha		10 945	.
	Jihovýchod		3 669	.
	Stredni Cechy		3 173	.
DK - Denmark		X	42 663	-0.45
DE - Germany			480 500	0.10
	Oberbayern		59 583	-0.23
	Stuttgart		44 534	0.07
	Darmstadt		33 592	-6.84
EE - Estonia		X	4 083	-1.11
EL - Greece			26 382	14.40
	Attiki		9 157	.
	Kentriki Makedonia		4 100	.
	Kriti		1 662	.
ES - Spain			151 487	12.83
	Comunidad de Madrid		35 686	6.95
	Cataluña		28 034	7.67
	Andalucía		14 008	-5.25
FR - France			343 618	3.03
	Île de France		135 231	2.17
	Rhône-Alpes		37 518	4.53
	Provence-Alpes-Côte d'Azur		21 225	-0.42
IE - Ireland			15 415	6.94
IT - Italia			164 023	4.55
	Lombardia		33 301	3.75
	Lazio		25 631	-3.13
	Piemonte		17 192	-2.29
CY - Cyprus		X	840	2.19
LV - Latvia		X	4 858	-8.24
LT - Lithuania		X	9 648	1.23
LU - Luxembourg		X	3 663	.
HU - Hungary			23 311	-1.65
	Kozep-Magyarország		15 192	.
	Del-Alfold		2 166	.
	Eszak-Alfold		1 962	.
MT - Malta		X	79	75.56
NL - Nederland			89 664	1.31
	Zuid-Holland		18 493	-0.75
	Noord-Brabant		16 311	-3.31
	Noord-Holland		15 370	-3.15
AT - Austria			31 308	.
	Wien		14 387	.
	Steiermark		5 852	.
	Oberösterreich		3 828	.
PL - Poland			77 040	1.08
	Mazowieckie		24 852	.
	Malopolskie		10 815	.
	Slaskie		7 030	.
PT - Portugal			26 211	6.59
	Lisboa		10 444	.
	Centro (P)		5 317	.
	Norte		4 961	.
SI - Slovenia		X	8 718	1.20
SK - Slovakia			13 354	-2.03
	Bratislavsky kraj		6 827	.
	Zapadne Slovensko		2 720	.
	Vychodne Slovensko		2 192	.
FI - Finland			57 176	3.87
	Etela-Suomi		33 171	.
	Lansi-Suomi		12 086	.
	Pohjois-Suomi		6 505	.
SE - Sweden			72 087	3.98
	Stockholm		22 059	0.02
	Västsverige		15 823	2.14
	Östra Mellansverige		11 674	-1.29
UK - United-Kingdom			277 500	2.14
BG - Bulgaria			15 453	2.82
	Yugozapaden		11 170	.
	Yuzhen tsentraten		1 308	.
	Severozitochen		1 138	.
HR - Croatia			12 960	.
RO - Romania			33 077	0.85
	Bucuresti		16 044	.
	Sud		3 747	.
	Centru		2 902	.
TR - Turkey			28 964	4.57
IS - Iceland		X	2 919	10.32
NO - Norway			28 488	4.23
	Oslo og Akershus		11 951	1.10
	Vestlandet		3 889	6.40
	Trøndelag		3 641	-5.31
CH - Switzerland			52 284	.
CN - China			1 035 197	8.23
JP - Japan			857 300	-3.90
RU - Russian Federation			975 541	-1.15

Source: Eurostat

## Biggest researchers increase is observed in Greece, Denmark and Austria

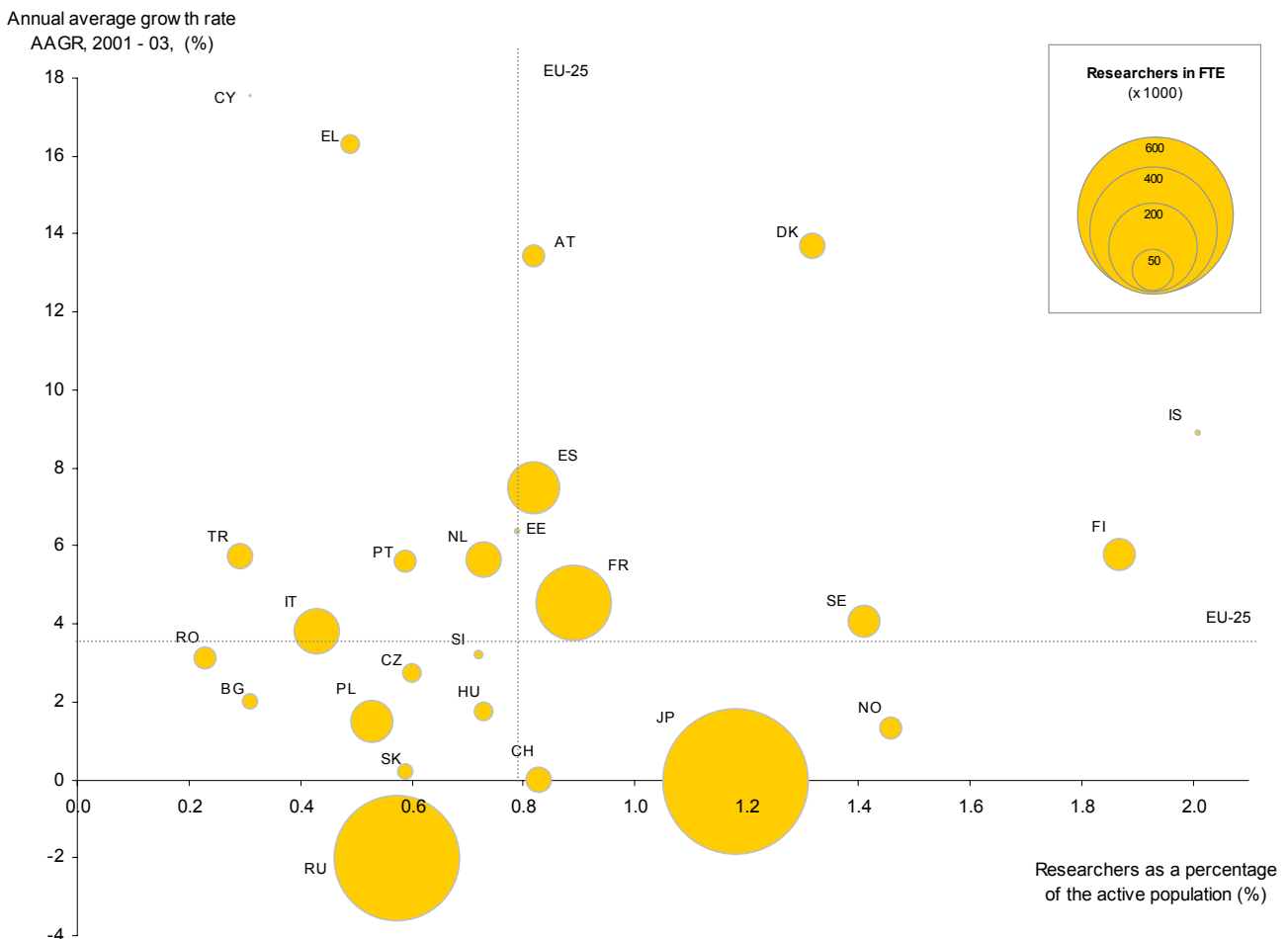
Figure 1 below focuses on researchers (RSE) and summarises three types of information. It illustrates a country's position concerning the proportion of its RSE in the active population (X – coordinate), the evolution of the RSE over the 3 last years observed with the annual average growth rate (Y – coordinate) and indicates with the size of the bubble the number of researchers in FTE.

Iceland, Finland, Denmark and to a lesser extent Sweden and Austria combine high figures for both AAGR and the RSE share of the active population. Their number of RSE is rather low when compared to other countries. The biggest RSE increases between 2001 and 2003 were observed in Cyprus (17.5 %), Greece (16.0 %) even if the share of RSE in the active population for both countries remains below the EU-25 average.

Only two countries with a very high number of RSE, Spain and France, had a share for the RSE as a percentage of the active population and the AAGR superior to the EU-25 average. The number of RSE in Japan stagnated between 2001 and 2003, while it decreased for the Russian Federation. The complete set of data is not available for Germany and the United Kingdom, but their researchers' AAGR is 0.5 % and 4.3 % respectively.

In the new Member States, the number of RSE also increased and for most of the countries their share of RSE in the active population remains close to the European average (except Estonia).

**Figure 1: Researchers in FTE – 2003 - related to the researchers' annual average growth rate- 2001/03 - and the researchers as a percentage of the active population – 2002 - in the EU-25 Member States, EEA countries, Candidate countries, the Russian Federation and Japan**



Source: Eurostat

Exceptions to the reference year 2003 for researchers (RSE) in FTE: FR, IT and FI: 2002; NL and IS: 2001; CH: 2000; EL: 1999; AT: 1998  
 Exceptions to the reference year 2002 for RSE as a % of the active population: PT, IS and NO: 2001; IT and CH: 2000; NL: 1999; AT: 1998; EL: 1997  
 Exceptions to the reference period 2002-2003 for the annual average growth rate 2001-03: FR: 2001-02; IT: 2000-02; FI: 1999-02; NL and IS: 1999-01; EL: 1997-99; AT: 1993-98  
 Provisional data: DK, PT and NO  
 Estimations: EE, SI and UK  
 OECD, MSTI 2005/1 data: SE, TR, JP and RU  
 RU: Underestimated or based on underestimated data  
 SE: University graduates instead of researchers.  
 AAGR: annual average growth rate 2001-03

## Most graduates from tertiary education in science, mathematics and computing in Ireland and the United Kingdom

In 2002, the leading Member States, with about half a million persons each graduating from tertiary education, were the United Kingdom, France and Poland. They came ahead of another country cluster covering Germany, Spain Turkey and Italy where between 200 000 and 300 000 persons graduated. In comparison, 2 238 327 and 1 047 890 persons graduated in the United States and Japan respectively.

The top three EU Member States, Poland (7.8 %), the United Kingdom (7.7 %) and France (7.1 %) showed also the highest share of graduates among the population aged 20-29. For other Member States this proportion varies a lot: for instance the share of graduates was less than 2.8 % in four Member States: Italy, the Czech Republic, Austria and Luxembourg.

By detailed fields of education, the highest share of graduates in "science, mathematics and computing" was found in Ireland (18.4 % of the total graduates), the United Kingdom (16.8 %), Iceland (13.7 %) and France (13.3 %). This percentage fell under 6 % in 10 out of 32 countries. The rate for Japan was particularly low: only 2.8 % graduated in "science, mathematics and computing" in 2002.

In "engineering, manufacturing and construction" the shares in total graduates were generally higher. The country ranking was also different: 22.2 % of the total graduates received their diplomas in "Engineering, manufacturing and construction" in Finland, 21.9 % in Sweden and 21.1 % in Bulgaria.

**Table 3: Graduation from tertiary education, in total and selected fields of education in comparison to the population aged 20-29, in the EU-25 Member States, EEA countries, Switzerland, Candidate countries, Japan and the United States, 2002**

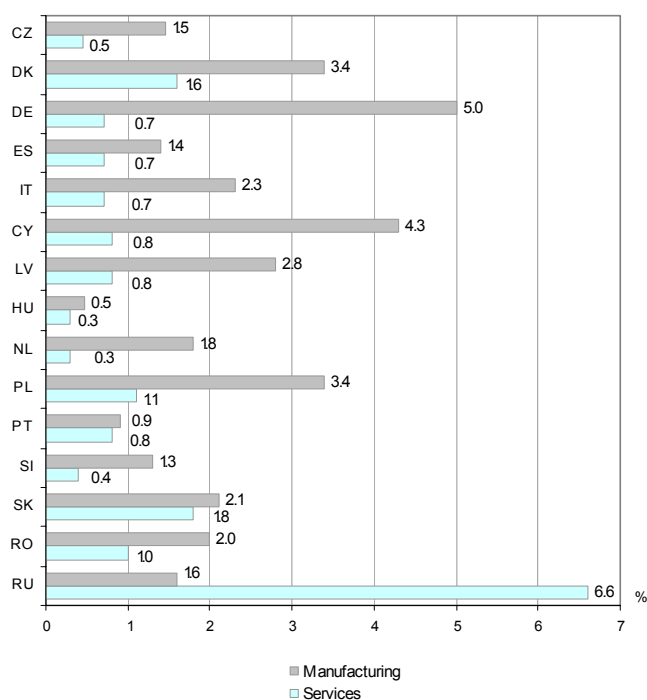
	Graduates in tertiary education - ISCED 5 & 6 - in 2002					
	Total graduates		Science, mathematics and computing		Engineering, manufacturing and construction	
	Total	As a % of the population aged 20-29	Total	% of total graduates	Total	% of total graduates
BE	72 939	5.6	6 054	8.3	7 689	10.5
CZ	43 664	2.6	4 926	11.3	5 196	11.9
DK	39 285	5.6	3 580	9.1	5 126	13.0
DE	293 920	3.3	27 131	9.2	49 567	16.9
EE	7 764	4.1	477	6.1	781	10.1
ES	291 425	4.5	31 071	10.7	48 185	16.5
FR	532 083	7.1	70 607	13.3	87 943	16.5
IE	45 028	6.7	8 288	18.4	4 754	10.6
IT	218 041	2.8	16 286	7.5	32 144	14.7
CY	2 839	3.4	213	7.5	160	5.6
LV	18 917	5.9	1 165	6.2	1 460	7.7
LT	29 753	6.4	1 342	4.5	5 571	18.7
LU	680	1.2	73	10.7	26	3.8
HU	62 296	4.0	1 932	3.1	5 821	9.3
MT	1 868	:	74	4.0	82	4.4
NL	85 818	4.3	4 601	5.4	8 958	10.4
AT	18 956	2.0	1 895	10.0	3 419	18.0
PL	459 737	7.8	16 721	3.6	33 105	7.2
PT	64 098	4.0	3 467	5.4	8 239	12.9
SI	14 278	4.8	553	3.9	2 295	16.1
SK	28 162	3.1	2 423	8.6	4 680	16.6
FI	36 898	5.9	2 689	7.3	8 195	22.2
SE	45 532	4.2	4 564	10.0	9 970	21.9
UK	562 374	7.7	94 621	16.8	56 314	10.0
BG	50 599	4.6	2 780	5.5	10 654	21.1
RO	93 467	2.8	5 035	5.4	15 392	16.5
TR	233 605	:	22 009	9.4	43 873	18.8
IS	2 195	5.4	301	13.7	98	4.5
NO	29 652	5.2	2 400	8.1	2 150	7.3
CH	57 699	6.5	6 109	10.6	7 353	12.7
JP	1 047 890	:	29 768	2.8	203 151	19.4
US	2 238 327	:	210 567	9.4	179 002	8.0

Source: Eurostat

Exceptions to the reference year 2002: DK, FR, IT, CY, FI and MT: 2001; LU: 2000

## Innovation expenditure higher in the manufacturing sector than in services

**Figure 2: Innovation expenditure as a percentage of turnover for all enterprises in manufacturing and services sectors, in selected EU-25 Member States, Candidate countries and the Russian Federation, 2003**



Source: Eurostat

Exceptions to the reference year 2003: DK, IT, NL, PT, SI, SK and RO

Innovation expenditure is a key indicator of the innovation activity of the business. Analysed as a proportion of turnover as shown in Figure 2, the shares vary more among countries in the manufacturing sector than in services. In manufacturing, Germany, Cyprus, Denmark and Poland stand out with 3.4 % or more of their turnover spent on innovation activities. In the services sector, the Russian Federation (with fully comparable data) is at the top with a share of innovation expenditure of 6.6 % of turnover, substantially above all other countries. Indeed, the innovation expenditure shares for the other countries are closer together: 1.5 percentage points separates the second country Slovakia (1.8 %) with the lowest countries Hungary and the Netherlands (0.3 % each).

The turnover of new or significantly improved products which are new to the enterprise is another significant innovation indicator – see Table 4. Two cases are highlighted: on one hand when the product is not new to the market and on the other hand when it is new to the market.

The products not new to the market illustrate the capability of an enterprise to adapt its product offer to the market by generating innovation. In the four economic sectors presented in Table 4, two countries are systematically included in the top 4: Denmark and Finland. Restricted to high technology and high technology services, the Netherlands joins Denmark and Finland.

**Table 4: Turnover of new or significantly improved products which are new to the enterprise in the EU-25 Member States, EEA countries, Candidate countries, 2003**

NACE	Turnover of new or significantly improved products which are new to the enterprise:							
	but not new to the market as a percentage of turnover for all enterprises				and also new to the market as a percentage of turnover for all enterprises			
	Manufacturing	Services	High Technology	High Technology services	Manufacturing	Services	High Technology	High Technology services
	%	%	%	%	%	%	%	%
CZ	5.0	6.6	6.4	12.1	1.4	1.3	2.8	6.4
DK	26.0	25.4	14.0	13.8	11.0	3.6	21.1	12.7
ES	10.6	3.2	11.5	10.0	4.7	1.2	10.0	2.5
IT	7.6	4.0	13.4	4.2	9.8	6.5	17.4	13.3
CY	3.9	3.9	4.3	2.9	1.8	0.9	0.0	2.3
LV	4.5	4.0	6.9	2.1	2.0	1.1	3.4	1.2
NL	4.5	1.6	20.5	13.5	9.3	1.2	17.2	6.7
PL	17.4	1.7	33.3	1.0	3.9	2.9	10.5	26.2
PT	1.2	0.4	1.7	0.4	1.7	1.9	3.2	1.9
SI	5.5	1.3	7.8	2.9	4.2	2.6	9.6	8.0
SK	4.4	1.8	4.1	2.7	18.7	4.7	8.0	13.1
FI	27.0	5.0	78.0	13.0	7.0	3.0	11.0	8.0
RO	2.0	1.0	4.0	4.0	11.0	5.0	10.0	12.0
RU	2.2	7.7	3.8	7.9	0.7	0.9	4.7	1.0

Source: Eurostat

Exceptions to the reference year 2002: DK, ES, IT, CY, LV, NL, SI, FI and RO: 2001

Sectors of activity

Manufacturing - NACE code: d;

High Technology - NACE codes: 24.4; 30; 32; 33; 35.3

Services - NACE codes: g to k (excluding public administration);

High Technology services - NACE codes: 64; 72; 73

Big gaps between countries' figures are noticed in the services sector where the turnover of Danish enterprises related to new or significantly improved products which are new to the enterprise as a percentage of turnover for all enterprises (25.4 %) is far above the second country, the Russian Federation (7.7 %).

The second indicator highlights the creative aspects of innovation when the product is also new to the market. More precisely, it is measured by the turnover of new or significantly improved products which are new to the enterprise and also new to the market as a percentage of turnover for all enterprises.

High shares in turnover in manufacturing sector are shown in the Slovakia, Romania and Denmark.

For services, this ratio generally lies between 2% and 5 % of the turnover of the enterprises concerned, with the highest figure (6.5 %) in Italy. Rather low rates were observed in some of the new Member States (e.g. the Czech Republic, Estonia and Cyprus) and also in the Netherlands.

In the high technology sector, Denmark and Italy were top at 21.1 % and 17.4 % respectively. Finally, Poland (26.2 %) recorded a very high figure in the high technology service sector ahead of Italy (13.3 %) and Slovakia (13.1 %).

### Highest share of high tech exports for Malta

High tech exports reflect countries' creation, commercialisation of new technologies and competitiveness in the world wide economy. Table 5 shows the trends of high tech exports between 2001 and 2003 as a share of total exports of a country.

In 2003, Malta (55 %) was at the top of the league in terms of high tech exports as a share of total exports ahead of Ireland (30 %) and Luxembourg (29 %), the EU-25 average being of 18 %. These smaller countries are ahead of the United States and Japan for which the proportion of high tech exports amounted to 27 % and 23 %.

The EU-25 average decreased slightly from 2001 to 2003, with a share of 18 % in 2003 being significantly lower than Japan and the United States

**Table 5: Exports of high technology products as a share of total exports in the EU-25 Member States, EEA countries, Switzerland, Candidate countries, Japan and the United States, 2001-2003**

	Exports of high technology products as a share of total exports		
	2001	2002	2003
EU-25	20.5	18.2	17.8
BE	9	7.5	7.4
CZ	9.1	12.3	12.3
DK	14	15	13.4
DE	15.8	15.1	14.7
EE	17.1	9.8	9.4
EL	5.6	6.7	7.4
ES	6.1	5.7	5.9
FR	25.6	21.9	20.4
IE	40.8	35.3	29.9
IT	8.5	8.2	7.1
CY	4	3.5	4.2
LV	2.2	2.3	2.7
LT	2.9	2.4	3
LU	27.9	24.6	29.3
HU	20.4	20.3	21.7
MT	58.1	56.5	55.5
NL	22.3	18.7	18.8
AT	14.6	15.7	15.3
PL	2.7	2.4	2.7
PT	6.8	6.2	7.4
SI	4.8	4.9	5.8
SK	3.7	2.9	3.4
FI	21.1	20.9	20.6
SE	14.2	13.7	13.1
UK	26.4	25.5	21
BG	1.8	2.6	2.9
RO	4.9	3.1	3.3
TR	3.2	1.6	1.8
IS	1.3	1.7	2
NO	3.6	4.6	3.7
CH	21	21.6	22.3
JP	24.7	23	22.7
US	28.6	27.9	26.9

Source: Eurostat



## ➤ ESSENTIAL INFORMATION – METHODOLOGICAL NOTES

### RESEARCH AND DEVELOPMENT — R&D

#### ▪ Definition

Research and experimental development — R&D — activities comprise 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.

#### ▪ Institutional classifications

Internal expenditure and R&D personnel are broken down with reference to the four institutional sectors in which the R&D takes place: Business enterprise sector (BES), Government sector (GOV), Higher education sector (HES) and Private non-profit sector (PNP).

#### ▪ R&D personnel

All persons employed directly on R&D should be counted, as well as those providing direct services such as R&D managers, administrators and clerical staff. Those providing indirect services, such as canteen and security staff, should be excluded — *Frascati Manual*, § 294-296.

#### ▪ Researchers

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 — *Frascati Manual*, § 301

#### ▪ Measurement units

Full-time equivalent — FTE: One FTE may be thought of as one person-year. — *Frascati Manual*, section 5.3.3.

Personnel by number of individuals — HC: The number of individuals who are employed mainly or partly on R&D — *Frascati Manual*, section 5.3.2.

#### ▪ GERD per Capita

The GERD per capita is a ratio representing R&D expenditure divided by the population.

#### ▪ European aggregates

EU-15 aggregate: until 1999: excluding Luxembourg; EU-25 aggregate: excluding Luxembourg (until 1999) and Malta (until 2000: HES and TOTAL).

### NOMENCLATURE OF TERRITORIAL UNITS FOR STATISTICS — NUTS

The NUTS is a five-level hierarchical classification comprising three regional and two local levels. NUTS subdivides each Member State into a whole number of NUTS 1 regions, each of which is in turn subdivided into a whole number of NUTS 2 regions, and so on. NUTS version: 2003.

### EDUCATION

The following programs are at the tertiary level of education:

- ISCED level 5A programs that are largely theoretically based and are intended to provide sufficient qualifications for gaining entry into advanced research programs and professions with high skill requirements
- ISCED level 5B programs that are generally more practical/technical/occupationally specific than ISCED 5A programs
- ISCED level 6 this level is reserved for tertiary programs that lead to the award of an advanced research qualification. The programs are devoted to advanced study and original research.

The field of education 'Science, mathematics and computing' comprises life sciences, physical sciences, mathematics and statistics.

### INNOVATION

An innovation is a new or significantly improved product (good or service) introduced to the market or the introduction within an enterprise of a new or significantly improved process. Innovations are based on the results of new technological developments, new combinations of existing technology or the use of other knowledge acquired by the enterprise. Innovations may be developed by the innovating enterprise or by another enterprise; however, purely selling innovations wholly produced and developed by other enterprises is not included as an innovation activity. Innovations should be new to the enterprise concerned; for product innovations they do not necessarily have to be new to the market and for process innovations the enterprise does not necessarily have to be the first to have introduced the process.

A product innovation is a product (good or service), which is either new or significantly improved with respect to its fundamental characteristics, technical specifications, incorporated software or other immaterial components, intended uses, or user friendliness. Changes of a solely aesthetic nature are not included.

### HIGH TECHNOLOGY

#### ▪ Definitions

NACE: The data in this publication are based on the statistical classification of economic activities in the European Community, NACE Rev.1.1.

Turnover: the value of everything that was sold by the unit during the reference year. It includes goods sold from stocks and goods bought for resale (enterprise, local unit, etc.)

#### ▪ High-tech industries

The aggregation of high-tech industries and knowledge based services are defined in accordance to their R&D intensity, for more details see the methodology document "M" for "High tech industry and knowledge based services" on NewCronos:

### SOURCES

United States, Japan and China: OECD, *Main Science and Technology indicators* – MSTI 2005/1.

### GENERAL ABBREVIATIONS

AAGR: Annual average growth rate in %

AGR: Annual growth rate in %

“:” = not available

### REFERENCE MANUALS

- *Standard method proposed for research and experimental development surveys* — *Frascati Manual*, OECD, 2002.
- *The Regional Dimension of R&D and Innovation Statistics and Experimental Development* — *Regional Manual*, European Commission, 1996.
- *Oslo Manual: Proposed Guidelines for Collecting and Interpreting Technological Innovation Data* – OECD.

Data presented in this Statistics in Focus reflect the **data availability** in Eurostat's reference database as of May 2005.

## ***Further information:***

### **Databases**

[EUROSTAT Website/Science and Technology/Research and development/Statistics on research and development/R&D personnel/Regional R&D personnel/Total R&D personnel by sectors of performance \(employment\) and region](#)

[EUROSTAT Website/Science and Technology/Research and development/Statistics on research and development/R&D personnel/National R&D personnel/Total R&D personnel by sectors of performance \(employment\), occupation and sex](#)

[EUROSTAT Website/Science and Technology/Research and development/Statistics on research and development/R&D personnel/National R&D personnel/R&D personnel and researchers \(FTE\) by size class in Business enterprise sector](#)

[EUROSTAT Website/Science and Technology/Research and development/Statistics on research and development/R&D expenditure/National R&D expenditure/Total intramural R&D expenditure \(GERD\) by sectors of performance](#)

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### **European Statistical Data Support:**

Eurostat set up with the members of the 'European statistical system' a network of support centres, which will exist in nearly all Member States as well as in some EFTA countries.

Their mission is to provide help and guidance to Internet users of European statistical data.

The complete details concerning this support network can be found on our Internet site:  
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This document has been produced in collaboration with Christophe Zerr