

# R&D expenditure and personnel

R&D intensity in the EU-25 unchanged at 1.85% in 2005 compared to 2004, but China making rapid progress

## Statistics in focus

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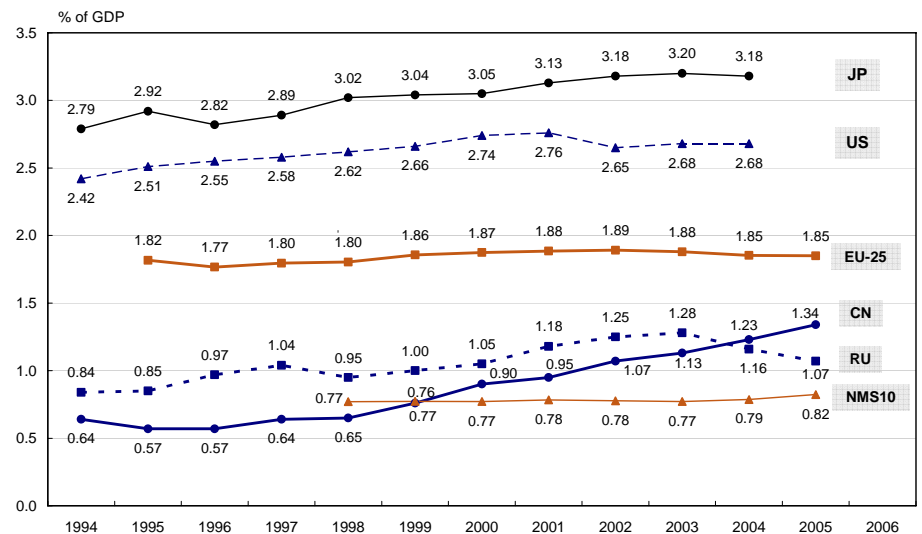
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Figure 1: R&D intensity (R&D expenditure as a % of GDP), all sectors, EU-25, NMS10, China, Japan, Russia and the United States — 1994 to 2005



#### NOTES

Eurostat estimations: EU-25 and NMS10

Provisional data: US 2003 and 2004

US 1993 - 2004: Excludes most or all capital expenditure

JP 1994-1995: Overestimated data

CN 1994-1999: underestimated data

Break in series: JP 1996, US 1998, CN 2000

Source: Eurostat/R&D statistics -OECD - MSTI 2006/1

### Main findings

- In 2005 R&D intensity (i.e. R&D expenditure as a % of GDP) in the European Union stabilised at 1.85%.
- In 2005 however, EUR 200.6 billion in nominal terms were spent on R&D in the EU-25, an increase of 3.6 % over the previous year.
- At national level, only two countries reached R&D intensities above the 2010 target of 3 % set by the Lisbon Strategy, namely Sweden (3.86 %) and Finland (3.48 %). China has made rapid progress, achieving an R&D intensity of 1.34 % in 2005.
- In the business enterprise sector (BES) the highest values in 2005 were recorded by Sweden (2.92 %), ahead of Finland (2.46 %), Germany (1.76 %) and Denmark (1.67 %).
- The business sector accounts for more than half of R&D expenditure, with an average of 55%. The situation at national level reveals a more diverse picture, with Luxembourg (80%), Japan (75 %), Switzerland, (70 %) and Finland (69 %) all achieving higher percentages.
- In 2004 more than 2% of all persons employed were active as researchers in Switzerland (4.4 %), Iceland (2.3 %) and Finland (2.2 %).

In 2005, R&D intensity (i.e. R&D expenditure as a % of GDP) in the EU stabilised at 1.85%, following the slight decrease observed in 2004. A similar slowdown was seen in the United States and Japan, leaving the gap between the three major economies in terms of R&D intensity unchanged. By contrast R&D intensity increased in the new

Member States (NMS10) who joined in May 2004 and China by 0.03 and 0.11 percentage points respectively. In 2005, China confirmed the steep increase which had enabled it to double its R&D ratio in less than a decade. For NMS10, the increase in R&D expenditure as a share of GDP is the first increase recorded in the last 10 years (Figure 1).

## At EU level R&D intensity is stable but expenditure is increasing in volume

At the level of individual EU Member States, only Sweden (3.86 %) and Finland (3.48 %) achieved R&D intensities above the 2010 target of 3 % set by the Lisbon Strategy. Sweden is still at the top of the league, far ahead of other countries, even though its figures are slowly falling. For instance, more than 1.3 percentage points separated Germany, ranked in third position, from Sweden and only six countries had R&D intensities above 2 %. Among those countries Austria (2.36 %), Finland (3.48 %) and Germany (2.51 %) recorded positive trends in R&D intensity (Table 2). Significant increases in R&D intensity were also observed

for the Czech Republic and Latvia (more than +0.15 percentage points).

In the business enterprise sector (BES), the highest values in 2005 were recorded by Sweden (with 2.92 %), ahead of Finland (2.46 %), Germany (1.76 %) and Denmark (1.67 %). For these countries there were only slight changes compared to the previous year. The biggest percentage point increases were in the Czech Republic (+0.12 %), Austria (+0.09 %) and Estonia (+0.08 %).

**Table 2: R&D expenditure in million euro and as a percentage of GDP, all sectors and business enterprise sector, EU-27, EU-25 and selected countries — 2002 to 2005**

	Total R&D expenditure								Business enterprise R&D expenditure							
	Millions of Euro				as a % of GDP				Millions of Euro				as a % of GDP			
	2002	2003	2004	2005	2002	2003	2004	2005	2002	2003	2004	2005	2002	2003	2004	2005
<b>EU-27</b>	185 878 s	187 708 s	193 984 s	201 020 s	1.88 s	1.87 s	1.84 s	1.84 s	119 083 s	119 669 s	123 582	128 091 s	1.21 s	1.19 s	1.17 s	1.17 s
<b>EU-25</b>	185 613 s	187 416 s	193 650 s	200 633 s	1.89 s	1.88 s	1.85 s	1.85 s	118 957 s	119 533 s	123 428 s	127 913 s	1.21 s	1.20 s	1.18 s	1.18 s
<b>BE</b>	5 201	5 177	5 350 p	5 428 p	1.94	1.89	1.85 p	1.82 p	3 662	3 608	3 714 p	3 705 p	1.37	1.31	1.28 p	1.24 p
<b>BG</b>	81	89	106	99	0.49	0.50	0.51	0.50	15	18	24	23	0.09	0.10	0.12	0.11
<b>CZ</b>	959	1 013	1 100	1 417	1.20	1.25	1.26	1.42	586	618	701	914	0.73	0.76	0.80	0.92
<b>DK</b>	4 634	4 855	4 899 p	5 097 p	2.51	2.56	2.48 p	2.44 p	3 198	3 355	3 332	3 481 p	1.73	1.77	1.69	1.67 p
<b>DE</b>	53 364	54 539	55 215	56 356 e	2.49	2.52	2.50	2.51 e	36 950	38 029	38 611	39 406 e	1.72	1.76	1.75	1.76 e
<b>EE</b>	56	67	83	104 p	0.72	0.79	0.88	0.94 p	17	23	32	47 p	0.22	0.27	0.34	0.42 p
<b>IE</b>	1 436 e	1 607 e	1 780 p	2 020 ep	1.10 e	1.16 e	1.21 p	1.25 ep	988 e	1 076	1 150 p	1 320 ep	0.76 e	0.77	0.78 p	0.82 ep
<b>EL</b>	:	978	1 021 p	1 112 p	:	0.63	0.61 p	0.61 p	287	313	317 p	326 p	0.20	0.20	0.19 p	0.18 p
<b>ES</b>	7 194	8 213	8 946	10 100 ep	0.99	1.05	1.06	1.12 ep	3 926 b	4 443	4 865	5 491 ep	0.54 b	0.57	0.58	0.61 ep
<b>FR</b>	34 527	34 569	35 534	36 396 p	2.23	2.17	2.14	2.13 p	21 839	21 646	22 210	22 543 p	1.41	1.36	1.34	1.32 p
<b>IT</b>	14 600	14 769	15 253	:	1.13	1.11	1.10	:	7 057	6 979	7 293	7 806 p	0.54	0.52	0.53	0.55 p
<b>CY</b>	34	41	47	54 p	0.30	0.35	0.37	0.40 p	7	9	10	12 p	0.06	0.07	0.08	0.09 p
<b>LV</b>	42	38	47	73	0.42	0.38	0.42	0.57	17	13	21	30	0.17	0.13	0.19	0.23
<b>LT</b>	100	111	137	157	0.66	0.67	0.76	0.76	17	23	29	32	0.11	0.14	0.16	0.16
<b>LU</b>	:	426	448	458 p	:	1.66	1.66	1.56 p	:	379	393	395 p	:	1.48	1.46	1.34 p
<b>HU</b>	706 i	693 i	721 i	838 i	1.00 i	0.93 i	0.88 i	0.94 i	250	255	297	362	0.35	0.34	0.36	0.41
<b>MT</b>	12	11	28 b	27 p	0.26	0.26	0.63 b	0.61 p	3	4	19 b	19 p	0.07	0.08	0.45 b	0.42 p
<b>NL</b>	8 019	8 376	8 723 p	:	1.72	1.76	1.78 p	:	4 543	4 804	5 039	5 148 p	0.98	1.01	1.03	1.02 p
<b>AT</b>	4 684	4 998 e	5 250	5 784 ep	2.12	2.21 e	2.23	2.36 ep	3 131	:	3 556	3 919 ep	1.42	:	1.51	1.60 ep
<b>PL</b>	1 172	1 036	1 139	1 386	0.56	0.54	0.56	0.57	238	284	327	440	0.11	0.15	0.16	0.18
<b>PT</b>	1 029 e	1 020	1 104 ep	1 189 p	0.76 e	0.74	0.77 ep	0.81 p	334 e	338	384 ep	430 p	0.25 e	0.25	0.27 ep	0.29 p
<b>RO</b>	184	203	235	:	0.38	0.39	0.39	:	111	118	130	:	0.23	0.22	0.21	:
<b>SI</b>	360	328	379	338 i	1.52	1.32	1.45	1.22 i	215	209	254	241 p	0.91	0.84	0.97	0.87 p
<b>SK</b>	148	169	174	194	0.57	0.58	0.51	0.51	95	93	86	97	0.37	0.32	0.25	0.25
<b>FI</b>	4 830	5 005	5 253	5 474	3.36	3.43	3.46	3.48	3 375	3 528	3 683	3 877	2.34	2.42	2.42	2.46
<b>SE</b>	:	10 642 i	:	11 109	:	3.95 i	:	3.86	:	7 886 i	:	8 410	:	2.93 i	:	2.92
<b>UK</b>	30 496	28 658	29 956	:	1.83	1.79	1.73	:	19 830	18 319	18 883	:	1.19	1.14	1.09	:
<b>IS</b>	280 e	274	297	:	2.99 e	2.86	2.83	:	160 e	142	167	:	1.71 e	1.48	1.59	:
<b>NO</b>	3 388	3 411	3 317	3 599 p	1.67	1.73	1.62	1.51 p	1 946	1 960	1 821	1 944 p	0.96	0.99	0.89	0.82 p
<b>EEA28</b>	189 281 s	191 101 s	197 259 s	204 574 s	1.89 s	1.88 s	1.85 s	1.84 s	121 063 s	121 635 s	125 404 s	130 034 s	1.21 s	1.20 s	1.18 s	1.17 s
<b>CH</b>	:	:	8 486	:	:	:	2.93	:	:	:	6 257	:	:	:	2.16	:
<b>HR</b>	271	292	345	:	1.11	1.11	1.22	:	115	114	144	:	0.47	0.44	0.51	:
<b>TR</b>	1 280	:	:	:	0.66	:	:	:	367	:	:	:	0.19	:	:	:
<b>CN</b>	16 452	16 444	19 097	24 030	1.07	1.13	1.23	1.34	10 066	10 256	12 761	7 719	0.65	0.71	0.82	0.91
<b>JP</b>	115 676	119 748	133 684	:	3.18	3.20	3.18	:	86 112	89 783	100 519	:	2.36	2.40	2.39	:
<b>RU</b>	4 545	4 899	5 473	6 559	1.25	1.28	1.16	1.07	3 176	3 353	3 780	4 458	0.87	0.88	0.80	0.73
<b>US</b>	292 153 i	258 520 pi	251 254 pi	:	2.65 i	2.68 pi	2.68 pi	:	205 021 i	180 343 pi	176 241 pi	:	1.86 i	1.87 ip	1.88 ip	:

### NOTES

EU-27, EU-25 and EEA28: Eurostat estimates

Information note (i):

HU - Total R&D expenditure: Defence is excluded; SE - 2003: underestimated data; SI - 2005 and Total R&D expenditure: underestimated data; US: excludes most or all capital expenditure.

Source: Eurostat/R&D statistics -OECD - MSTI 2006/1

## In the EU, 55% of R&D expenditure was funded by the BES in 2005

Table 3 indicates that 'industry' is the most important source of financing of R&D in almost all countries except the new Member States. On average, however, the EU's performance is below the objective of the Lisbon Strategy which set a level of 66 % for private R&D funding. It is the business sector- with 55% - that still contributes the largest share. This percentage ranks behind the national rates of Luxembourg (80 %), Japan (75 %), Switzerland (70 %), Finland (69 %), China (66 %) and the United States (63 %).

The government sector (GOV) comes in second place, funding 35 % of the EU's R&D expenditure, whereas funding from abroad remains small - amounting to 8 % in the EU in 2004.

The situation is different in the new Member States, the candidate countries and the Russian Federation, where the sources of finance are more balanced and the government sector plays a greater role in R&D funding.

**Table 3: R&D expenditure by sources of funds in million euro and as a percentage of total, all sectors and business enterprise sector, EU-25 and selected countries — 2004**

	Total R&D expenditure					Business enterprise R&D expenditure				
	TOTAL	Sources of funds				TOTAL	Sources of funds			
		BES	GOV	Other national sources	Abroad		BES	GOV	Other national sources	Abroad
Millions of Euro	as a % of total				Millions of Euro	as a % of total				
<b>EU-25</b>	<b>193 650 s</b>	<b>55 s</b>	<b>35 s</b>	<b>2.3 s</b>	<b>8 s</b>	<b>123 428 s</b>	<b>82 s</b>	<b>8 s</b>	<b>0.1 s</b>	<b>10 s</b>
BE	5 177	60	24	3.2	13	3 608	82	5	0.0	13
BG	99	28	66	0.5	5	24	96	0	0.0	3
CZ	1 100	53	42	1.6	4	701	80	15	1.4	4
DK	4 855	60	27	2.7	10	3 355	86	2 i	:	12
DE	55 215	67	30	0.4	2	38 611	92 i	6 i	0.1	2
EE	83	36	44	2.4	17	32	85	4	0.1	10
IE	1 780 p	57 p	32 p	1.7 p	9 p	1 150 p	87 p	3 p	0.0 p	10 p
EL	978	28	46	3.8	22	313	76	4	0.3	19
ES	8 946	48	41	4.8	6	4 865	82	12	0.3	5
FR	35 534	52	38	1.9	9	22 210	80	9	0.0	11
IT	15 253	:	:	:	:	7 293	75	14	0.0	11
CY	47	19	64	5.9	12	10	85	5	0.1	10
LV	47	46	31	0.0	23	21	77	3	0.0	20
LT	137	20	63	6.3	11	29	72	3	0.5	25
LU	426	80	11	0.2	8	379	89	3	0.0	8
HU	721 i	37	52 i	0.6	10	297	77	4	0.1	18
MT	12	19	60	0.0	22	3	75	17	0.0	8
NL	8 376	51	36	1.4	11	4 804	82	3	0.1	15
AT	5 250	47	33	0.9	19	3 556	67	6	0.0	26
PL	1 139	27	65	2.7	5	327	80	17	0.1	3
PT	1 020	32	60	3.2	5	338	89	5	0.0	5
RO	235	44	49	1.5	5	130	67	27	0.1	6
SI	379	58	30	0.4	11	254	82	4	0.2	13
SK	174	38	57 i	0.3	4	86	71	27	0.0	2
FI	5 253	69	26	1.2	3	3 683	95	4	0.0	1
SE	10 642 i	65 i	23 i	4.3 i	7 i	7 886 i	86 i	6 i	0.2 i	8 i
UK	29 956	44	33	5.8	17	18 883	66	10	0.0	23
IS	274	44	40	1.5	14	142	77	4	0.0	20
NO	3 411	49	42	1.5	7	1 960	81	10	0.0	9
<b>EEA28</b>	<b>197 259 s</b>	<b>55 s</b>	<b>35 s</b>	<b>2.3 s</b>	<b>8 s</b>	<b>125 404 s</b>	<b>82 s</b>	<b>8 s</b>	<b>0.1 s</b>	<b>10 s</b>
CH	8 486	70	23	2.3	5	6 257	91	2 i	0.5	7
HR	345	43	47	7.8	3	144	94	2	0.0	5
TR	1 280	41	51	6.9	1	367	94	3	1.1	2
CN	19 097 b	66 bi	24 bi	:	1 bi	12 761 b	91 bi	5 bi	:	2 bi
JP	119 748	75	18 e	6.8 e	0	89 783	98	1	0.1	0
RU	5 473	31	61	0.4	8	3 780	38	53	0.1	9
US	251 254 pi	64 pi	31 pi	5.4 pi	:	176 241 pi	89 i	11 p	: i	: i

### NOTES

EU-25, EEA28: Eurostat estimates

Exceptions to the reference year 2004: MT, TR 2002; BE, DK, EL, LU, NL, PT, SE, IS, NO, JP: 2003

Information note (i):

HU - Total R&D expenditure: Defence is excluded; DK: includes other classes; DE: BES underestimated data, GOV overestimated data; SE, SK: underestimated data.

CH: Federal or central government only; CN: the sum of the breakdown does not add up to the total; US - Total R&D expenditure: excludes most or all capital expenditure.

US - BES and sector of funds BES: excludes most or all capital expenditure, includes R&D in the SSH and includes other classes; US - BES and sector of funds Other and Abroad: included elsewhere.

Source: Eurostat/R&D statistics - OECD - MSTI 2006/1

## Researchers accounted for almost 1 % of total employment in the EU in 2004

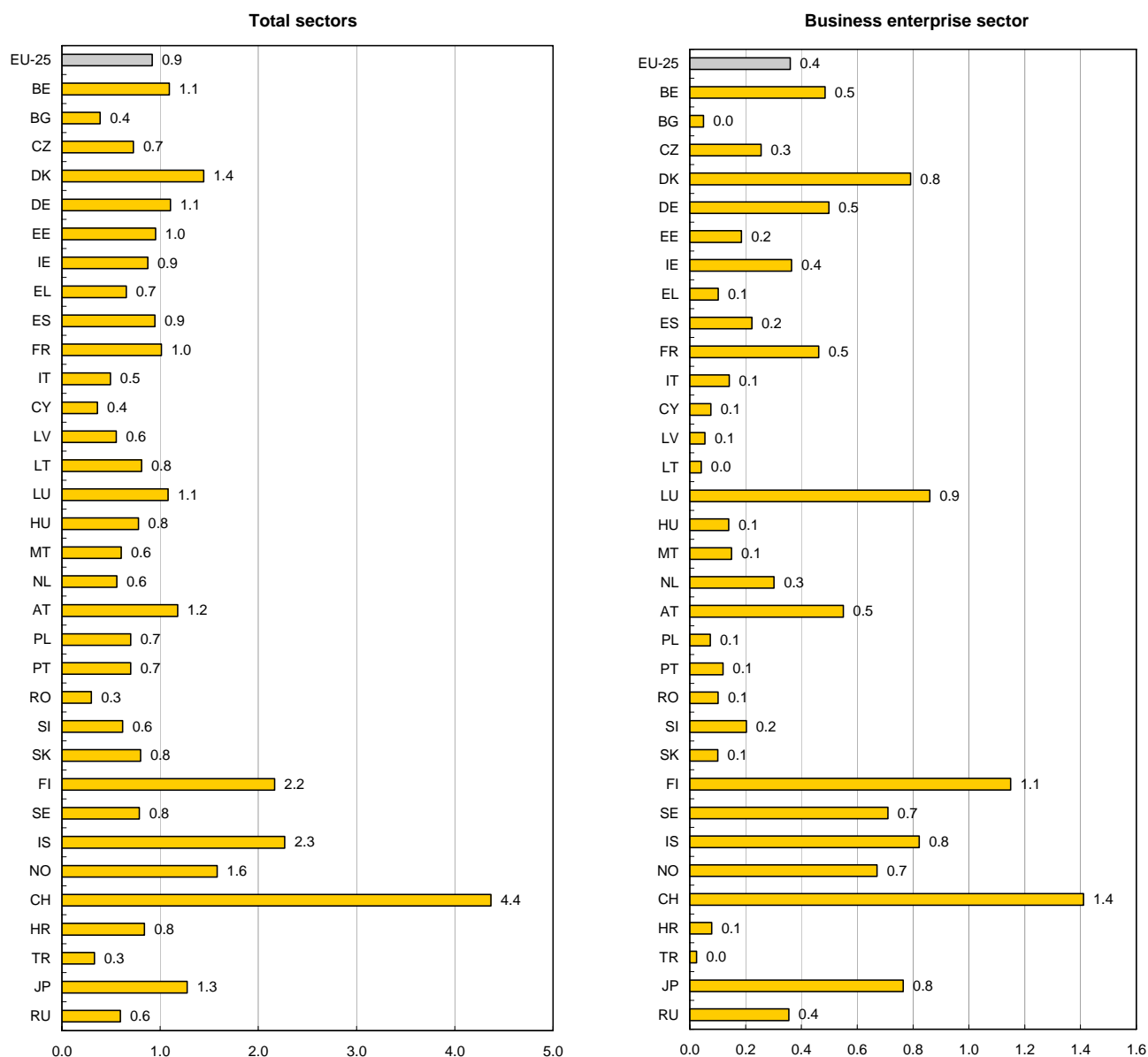
In Switzerland (4.4 %), Iceland (2.3 %) and Finland (2.2 %) more than 2% of all persons employed were active as researchers in 2004 (Figure 4). Norway and Denmark recorded respective shares of 1.6% and 1.4% followed by larger countries such as Japan (1.3%) and Germany (1.1%). At the lower end, in Romania, Cyprus, Turkey and Bulgaria researchers accounted for 0.3 % to 0.4 % of total employment in 2004.

In the business enterprise sector the biggest proportions of researchers in total employment were observed in the small

EU economies: Finland (1.1 %) comes ahead of Luxembourg (0.9%) and Denmark (0.8%). Also in this sector, in seven countries researchers make up over 0.7% of total employment, which is almost twice the EU average (Figure 4). The only country which stood out in all performance sectors was Finland.

Researchers were not very well represented in business employment, with rates below 0.1 % in seven countries (Greece, Cyprus, Latvia, Lithuania, Poland, Portugal and Slovakia).

**Figure 4: R&D researchers as a percentage of total employment (HC), all sectors and business enterprise sector, EU-25 and selected countries — 2004**



### Notes

EU-25: Eurostat estimate

Exceptions to the reference year 2004: TR 2002; BE, DE, EL, LU, NL, PT, SE, IS, NO, JP: 2003

Information note (i):

FR, HU - Total: Defence excluded; IE: provisional data; FI: data by qualification; MT: the sum of the breakdown does not add up to the total;

SE, NO: University graduates instead of researchers; LU: Data in the Total sectors with reference to the HES correspond to 2001.

Source: Eurostat/R&D statistics -OECD - MSTI 2006/1

## In 2004, R&D personnel in FTE in the EU-25 numbered about 2 millions

In 2005, Germany and France employed almost half of the EU's R&D personnel measured in full-time equivalents, as their R&D personnel amounted to 469 500 and 352 485 persons respectively (Table 5). Spain and Italy came next, with 173 804 and 164 026 persons respectively.

Whereas Germany accounted for 23% of total R&D personnel in the EU-25, it employed 27% of the EU-25's R&D personnel in the BES and only 15% in the higher education (HES). In absolute terms, Germany and France also led in all economic sectors, generally followed in third and fourth places by Spain and Italy.

Among the new member states, the main countries employing R&D personnel are Poland (76 761), the Czech Republic (43 371) and Hungary (23 239). At the EU-25 level these three rank 7th, 12th and 15th respectively. Except for the Czech Republic, most of the R&D personnel work in the public sector, in contrast to the old Member States.

The biggest proportions of researchers among R&D personnel are found in Portugal (82%), Poland (81%), Estonia (76%) and Slovakia (76%). In the big economies like Germany, France or Italy, other R&D personnel make up to 40% of the total.

**Table 5: R&D personnel and researchers in FTE and in percentage, EU-25 and selected countries — 2005**

	TOTAL R&D personnel in FTE				Researchers as a % of total R&D personnel			
	TOTAL	BES	GOV	HES	TOTAL	BES	GOV	HES
<b>EU-25</b>	2 040 667 s	1 095 490 s	292 185 s	632 313 s	60 s	55 s	55 s	70 s
BE	54 128 p	31 861 p	3 967 p	17 689 p	59 p	51 p	56 p	74 p
BG	15 853	2 062	10 172	3 367	63	56	60	77
CZ	43 370	22 143	10 223	10 776	56	47	60	70
DK	43 545 p	28 461 p	3 078 p	11 668 p	65 p	62 p	66 p	71 p
DE	469 500 e	298 000 e	76 000 e	95 500 e	57 e	54 e	53 e	69 e
EE	4 363 p	1 399 p	696	2 176	76 p	63 p	68	88
IE	16 168 ep	10 000 ep	1 168 ep	5 000 e	69 ep	64 ep	44 ep	85 e
EL	34 004 p	11 099 p	5 509 p	17 189 p	50 p	39 p	42 p	60 p
ES	173 804 pe	75 616 pe	31 832 pe	66 001 pe	63 pe	47 pe	64 pe	81 pe
FR	352 485	197 223	51 931 i	97 036	57	54	48 i	67
IT	164 026	67 519	32 401	60 694	44	41	44	47
CY	1 075 p	240 p	360 p	400 p	59 p	50 p	31 p	94 p
LV	5 483	1 370	1 256	2 856	60	34	47	78
LT	11 002	1 190	3 113	6 699	69	60	58	76
LU	4 360 p	3 623 p	553 p	184 p	48 p	42 p	69 p	96 p
HU	23 239 i	7 393	7 652 i	8 194	68 i	68	65 i	72
MT	701 p	353 p	56	292	63 p	54 p	50	77
NL	91 594 p	49 915	13 579 i	28 100 p	41	46	57 i	36
AT	46 612 ep	31 671 ep	2 212 ep	12 499 ep	61 ep	57 ep	51 ep	72 ep
PL	76 761	13 966	17 877	44 763	81	67	68	90
PT	25 651 p	6 208 p	4 173 p	11 892 p	82 p	66 p	71 p	94 p
RO	33 361	16 368	9 853	6 917	64	56	64	82
SI	7 021	4 292	1 788	910	55	44	65	82
SK	14 404	3 524	3 717	7 146	76	55	67	90
FI	57 471	32 109	7 422	17 453	69	68	59	74
SE	77 925	56 941	3 391	17 223	69	60	84	97
UK	:	147 356	:	:	:	65	:	:
IS	3 050	1 422	794	746	65	62	60	77
NO	30557 p	16710 p	5147 p	8700 p	72 p	68 p	67 p	80 p
<b>EEA28</b>	2 073 353 s	1 113 062 s	297 964 s	641 559 s	60 s	55 s	55 s	71 s
CH	52 250	33 085	810 i	18 355 e	49	38	52 i	67 e
HR	11 162	2 831	3 634	4 697	64	36	67	79
TR	28 964	5 918	5 502	17 544	83	62	50	100 i
CN	1 094 831	656 097	249 477	189 257	79	74	77	98
JP	882 414	580 628	61 893	224 049	77	79	54	77
RU	973 382	592 625	278 756	99 299	50	45	53	72

### NOTES

EU-25, EEA28: Eurostat estimates

Exceptions to the reference year 2005: EU-25, EU-15, EEA, FR, IT, NL (Total personnel), IS, CH, HR, RO: 2004; NL (RSE), CN, JP, RU: 2003; TR 2002.

Information note (i):

FR, HU - Total: Defence excluded; NL: includes other classes; TR: University graduates instead of researchers; CH: Federal or central government only.

Source: Eurostat/R&D statistics -OECD - MSTI 2006/1

## Between 2002 and 2004, there were 3% more EU researchers per year on average

The annual percentage increase in the number of researchers was greater than the increase in total R&D personnel: 3.5 % against 1.9 % in 2004 (Table 6). In particular there was an increase in researchers in seven countries which recorded annual growth rates above 5 %: Sweden, Hungary, Denmark, Cyprus, Spain, Austria and the Czech Republic.

Except for Germany, the number of researchers increased over the past year in all the big EU economies.

At the other end of the scale, R&D personnel showed a small decrease, i.e. less than 2 %, in eight EU countries. Estonia was the exception, recording a decrease of about 8 % (Table 6).

Disparities between countries also appear when calculating the annual average growth rate (AAGR) of total R&D personnel for the period 2002-2005. The top rankings are held by three smaller economies: the Czech Republic once again (18.5 %), Malta (13.8 %) and Cyprus (9.3 %), ahead of Spain (9 %). These countries are leading in terms of both total R&D personnel and researchers in FTE.

Spain is ahead among the bigger EU countries, with an AAGR of 9 %, but a large gap separates it from the other countries, namely France (1.3 %), Italy (0%) and Germany (-0.7 %). No data were available for the UK.

**Table 6: R&D personnel and researchers in FTE, annual growth rate and annual average growth rate 2002 – 2005, EU-25 and selected countries — 2002 – 2005**

	Total R&D personnel - FTE					Researchers - FTE				
	Annual growth rate - %				AAGR 2002-2005 %	Annual growth rate - %				AAGR 2002-2005 %
	2002	2003	2004	2005		2002	2003	2004	2005	
<b>EU-25</b>	<b>2.2 s</b>	<b>0.6 s</b>	<b>1.9 s</b>	<b>:</b>	<b>1.3</b>	<b>3.0 s</b>	<b>2.4 s</b>	<b>3.5 s</b>	<b>:</b>	<b>3.0</b>
BE	-7.0	0.4	1.3 p	2.3 p	1.3	-4.9	0.8	1.8 p	1.6 p	1.4
BG	0.5	2.8	1.3	1.3	1.8	0.1	4.0	2.5	2.3	2.9
CZ	-0.3	7.4	2.9	50.8	18.5	-0.1	5.6	3.1	48.3	17.3
DK	6.3	-1.9	2.6	2.0 p	0.9	31.3 b	-2.6	5.2	7.7 p	3.3
DE	-0.1 e	-1.6	-0.3	-0.3 e	-0.7	0.5 e	1.2	0.7	-1.0 e	0.3
EE	10.3	0.4	14.3	-7.9 p	1.9	14.1	-1.4	11.7	-1.1 p	2.9
IE	2.0 e	6.4	8.7 p	2.9 ep	6.0	4.8 e	7.1	8.7 p	2.2 ep	5.9
EL	:	2.6	:	3.3 p	3.0	:	4.3	:	4.4 p	4.3
ES	6.8	12.8	6.9	7.3 pe	9.0	4.0	11.0	9.2	8.7 pe	9.6
FR	3.1	0.7	1.9	:	1.3	5.1	3.4	3.8	:	3.6
IT	6.6	-1.3	1.4	:	0.0	6.8	-1.3	2.4	:	0.5
CY	19.2	12.1	10.3	5.8 p	9.3	30.4	12.6	19.0	8.2 p	13.2
LV	-3.3	-8.2	5.0	7.4	1.2	-1.3	-7.2	3.8	-1.3	-1.7
LT	-20.2	1.2	9.4	4.2	4.9	-21.7	4.4	11.4	3.8	6.5
LU	:	:	7.7	1.0 p	:	:	:	4.2	3.0 p	:
HU	3.3 i	-1.7 i	-2.1 i	1.8 i	-0.7 i	2.0 i	1.4 i	-1.8 i	6.5 i	2.0 i
MT	:	-13.1	73.5 b	-2.2 p	13.8	:	1.6	57.7 b	1.5 p	17.6
NL	-2.0	-1.6	6.5 p	:	2.4	-16.2 b	-2.3	:	:	:
AT	:	:	5.0	8.7 ep	6.2	:	:	3.7	8.7 ep	5.4
PL	-1.3	1.1	1.7	-2.0	0.2	1.0	3.3	4.0	2.0	3.1
PT	5.6 e	5.3	0.2 ep	0.2 p	1.9	7.1 e	6.6	1.9 ep	1.8 p	3.4
RO	0.5	0.8	0.9	:	0.9	2.8	3.3	1.4	:	2.4
SI	0.1	-21.0	4.8	-1.6	-6.6	3.2	-18.7	6.8	-4.9	-6.2
SK	-5.5	-2.0	7.3	0.5	1.9	-4.2	4.9	11.3	1.9	6.0
FI	3.0	3.9	1.9	-1.4	1.4	:	:	:	-3.5	:
SE	:	0.5	:	3.3	1.9	:	2.0	:	6.3	4.1
UK	:	:	:	:	:	:	:	:	:	:
IS	-3.6 e	5.1	3.7	:	4.4	:	1.5	3.7	:	2.2
NO	1.0	6.1	2.5	2.7 p	3.8	:	2.3	0.8	3.3 p	2.2
<b>EEA28</b>	<b>2.2 s</b>	<b>0.7 s</b>	<b>1.9 s</b>	<b>:</b>	<b>1.3</b>	<b>3.0 s</b>	<b>2.4 s</b>	<b>3.6 s</b>	<b>:</b>	<b>3.0</b>
CH	:	:	0.0	:	:	:	:	-0.9	:	:
HR	:	-29.4	22.0	:	-7.2	:	-31.6	21.8	:	-8.7
TR	4.6	:	:	:	:	5.7	:	:	:	:
CN	8.2	5.8	:	:	:	9.1	6.4	:	:	:
JP	-3.9 b	2.9	:	:	:	-4.3 b	4.5	:	:	:
RU	-2.1	-1.4	-2.2	:	-1.8	-2.7	-0.9	-2.0	:	-1.5

### NOTES

EU-25, EEA28: Eurostat estimates

AAGR: Annual average growth rate; AGR: Annual growth rate;

Exceptions to the reference periods:

AAGR 2002-2005 - Total personnel: EU-25, EEA, FR, IT, NL, IS, CH, RU: 2002-2004; EL, SE: 2001-2005

AAGR 2002-2005 - RSE: EU-25, EEA, FR, HR, RO, RU: 2002-2004; IS: 2001-2004; EL, SE: 2001-2005

Information note (i):

HU: Defence excluded.

AGR - Total personnel: EL, SE 2001/03, 2003/05; AT: 2002/04; CH: 2000/04

AGR - RSE: see the exception for total personnel plus IS, NO: 2001/03

Source: Eurostat/R&D statistics -OECD - MSTI 2006/1



## ➤ ESSENTIAL INFORMATION – METHODOLOGICAL NOTES

### Research and experimental development (R&D)

Research and experimental development 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.

### The business enterprise sector (BES)

With regard to R&D, the business enterprise sector includes: all firms, organizations and institutions whose primary activity is the market production of goods or services (other than higher education) for sale to the general public at an economically significant price and the private non-profit institutions mainly serving them — *Frascati Manual*, § 163.

### The government sector (GOV)

In the field of R&D, the government sector includes: all departments, offices and other bodies which furnish but normally do not sell to the community those common services, other than higher education, which cannot otherwise be conveniently and economically provided, and administer the state and the economic and social policy of the community (public enterprises are included in the business enterprise sector) as well as PNPs controlled and mainly financed by government — *Frascati Manual*, § 184.

### The higher education sector (HES)

This sector comprises: all universities, colleges of technology and other institutes of post-secondary education, whatever their source of finance or legal status. It also includes all research institutes, experimental stations and clinics operating under the direct control of or administered by or associated with higher education establishments — *Frascati Manual*, § 206.

### The private non-profit sector (PNP)

This sector covers: non-market, private non-profit institutions serving households (i.e. the general public) and private individuals or households — *Frascati Manual*, § 194.

### R&D indicators - Expenditure

#### • Current EUR

Current EUR values are obtained for the Eurozone by recalculating former national currency values on the basis of the fixed exchange rate and then applying the average exchange rate for the year in question. As a result, the values for countries appearing in tables quoted in national currencies differ from those quoted in current EUR for years before 1999, except in the case of Greece (2001). Current EUR values for non-Eurozone countries are obtained by directly applying the average exchange rate for the year in question.

#### • R&D intensity and GDP

R&D intensity represents the R&D expenditure as a percentage of GDP. It is calculated by relating R&D expenditure in current national currencies to GDP for the sectors and years in question.

At the national level, the GDP used for the calculation of R&D intensity correspond to the table 'a\_gdp\_c' in NewCronos. The release date for both GDP tables was 18/11/2006.

Eurostat implemented the allocation of FISIM in the annual European aggregates starting with the first regular release on 30 November 2005. Before that date, there was no allocation of FISIM in euro-zone and EU-25 aggregates.

#### • R&D expenditure by sources of funds

Sources of funds are subdivided into five sources of funds: Business Enterprise, Government, Higher Education, Private non-profit and Abroad.

### R&D indicators - 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 (RSE)

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.

#### • Full-time equivalent (FTE)

One FTE may be thought of as one person-year. For instance, a person who normally spends 40% of his time on R&D and the rest of it on other work (e.g. lecturing, university administration, guidance) should be counted as only 0.4 FTE — *Frascati Manual*, § 331-345.

#### • Personnel by number of individuals (by headcounts, HC)

It represents the number of individuals who are employed mainly or partly on R&D — *Frascati Manual*, § 326-330.

#### • R&D personnel and researchers as a percentage of employment

The source for the employment statistics is the European Labour Force Survey (EU LFS).

### European aggregates

For R&D personnel, EU totals are calculated as the sum of the national data by sector. If data are missing, estimates are first made for the country in question, reference period, institutional sector or relevant R&D variable, as appropriate. This method is not identically applied to the calculation of R&D personnel in head count (HC). The estimates for R&D personnel in full-time equivalent (FTE) serve as a basis for the HC calculation. An FTE/HC ratio based on available FTE and HC personnel data at the national level is estimated for the EU aggregates, by institutional sector and by year. This ratio is then applied to the FTE data to calculate the EU totals in HC.

### Sources

United States, Japan and China: OECD, *Main Science and Technology Indicators* – MSTI 2006/1.

### General abbreviations

AAGR	annual average growth rate
p	provisional value
e	estimated value
s	Eurostat estimate
r	revised value
f	forecast
b	break in series
i	more information in metadata
:	not available

### Reference manual

*Standard method proposed for research and experimental development surveys* — *Frascati Manual*, OECD, 2002.

Data presented in this *Statistics in Focus* shows the data availability in Eurostat's reference database as of December 2006.


## ***Further information:***

Data: [EUROSTAT Website/Home page/Science and technology/Data](#)

 Science and technology

 *Research and development*

 *Statistics on research and development*

 R&D expenditure at national and regional level

 R&D personnel at national and regional level

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

Eurostat has 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.

Contact details for this support network can be found on our Internet site: <http://ec.europa.eu/eurostat/>

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This document has been produced in collaboration with Christophe Zerr.