

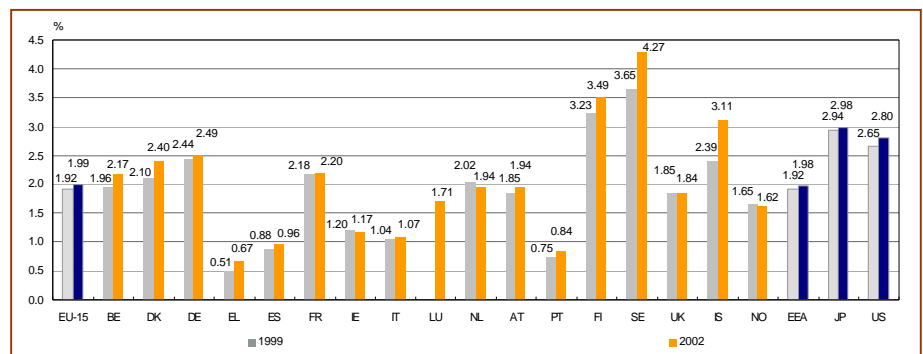
# R&D expenditure and personnel in the EU

EU R&D expenditure increases in 2002

but the gap with the USA and Japan remains

*Simona Frank*

Figure 1: R&D expenditure as a percentage of GDP, All sectors — 1999-2002



- Exceptions to the 2002 reference year  
BE, DK, DE, ES, IE, PT, SE and NO: 2001; IT, LU, NL and JP: 2000; EL: 1999.
- Exceptions to the 1999 reference year  
EL: 1997; AT (BES, GOV and HES): 1998.

Sources: Eurostat, OECD.

## Statistics in focus

### SCIENCE AND TECHNOLOGY

THEME 9 – 8/2003

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- The EU-15 increased its R&D intensity to 1.99 % in 2002, but without reducing the gap with Japan (2.98 %) and the United States (2.80 %).
- At the institutional sector level, in 2002, R&D expenditure as a % of GDP in the EU-15 represented 1.30 % in the business enterprise sector (BES), 0.42 % in the higher education sector (HES) and 0.26 % in the government sector (GOV). The trends were slightly up for the GOV and HES but remained stable for the BES.
- The top three countries in terms of R&D intensity in 2002 were Sweden (4.27 %), Finland (3.49 %) and Iceland (3.11 %).
- In 2002, the EU spent 151 billion constant PPS (182 billion EUR) on R&D expenditure with an annual growth of 1.90 % (compared to the previous year).
- At the national level, the top three countries in terms of R&D expenditure, were Germany with 43 billion constant PPS, France (28 billion) and the United Kingdom (22 billion). The highest growth observed for R&D expenditure was in Portugal (8.6 %), Denmark (7.4 %) and Ireland (7.4 %).
- In 2001, in terms of fields of science, most R&D expenditure was carried out in *Natural sciences, Engineering and technology* and *Medical sciences*.
- In 2002, 1.39 % of the labour force in the EU-15 worked in R&D, or 1.83 million R&D personnel expressed in full-time equivalent (FTE) and represented an increase of 1.6 % compared to 2001.
- Women researchers are less represented than men particularly in the BES. Parity is reached only in Portugal (GOV, 52 %), Greece (HES, 50 %) and Denmark (GOV, 49 %).



## R&D expenditure

### *The EU-15 increased its R&D intensity in 2002 to 1.99 %, but without reducing the gap with the United States and Japan*

With 1.99 % of its GDP allocated to R&D expenditure in 2002, the EU-15 increased its R&D intensity level by 0.07 percentage points since 1999. Amongst the triad, this level is still far behind Japan, which comes at the top with a proportion of 2.98 % of GDP devoted to R&D, while the US reached 2.80 %. Three EEA countries compete with them, namely Sweden, Finland and Iceland who recorded R&D intensities superior to 3 %. Sweden (4.27 %) and Iceland (3.11 %) increased by more than 0.5 percentage points 1999 and 2002. For the same period, the trend was positive for all EEA countries except for the Netherlands and Norway. Among the 4 countries with the largest economic weight, Germany, France, the UK and Italy, only the first two had an R&D intensity superior to the EU average in 2002 — Figure 1.

At the institutional sector level, 1.30 % of R&D expenditure as a % of GDP for the EU-15 was carried out in the business enterprise sector (BES) in 2002. The trend for this sector remained stable compared to 2001, however it was the one with the largest rise between 1999 and 2002; increase of 0.05 percentage points. The higher education sector (HES) with 0.42 % comes second (with an increase of 0.03 percentage points) whereas the trend for the government sector remains stable.

At the national level, Sweden (3.31 %) and Finland (2.47 %) recorded the highest values in the BES, whereas in the GOV it was Iceland (0.76 %), France and Finland (0.37 % each) and, again, Sweden (0.83 %) and Finland (0.65 %) in the HES — Table 1.

In 2002, the EU spent 151 billion constant PPS (182 billion EUR) on R&D, which represented 63 % of the United States R&D expenditure. This proportion has remained unchanged over the last years; in 1999 it was 64 %. On the other hand, the gap with Japan increased slightly in favour of the EU, as Japanese expenditure was 63 % of the EU's in 1999 against 59 % in 2000.

Among the EEA countries, Germany takes the lead with R&D expenditure amounting to 43 billion constant PPS in 2002. It comes before France (28 billion constant PPS) and the UK (22 billion constant PPS). All the countries showed an increase of their R&D expenditure in 2002 (or the last year for which the data is available) compared to 1999 apart from the Netherlands — Figure 2.

The trends for R&D expenditure compared to the previous year are globally positive. For the total sector, Portugal (8.6 %), Denmark (7.4 %) and Ireland (7.4 %) showed the highest increases, whereas the UK, the Netherlands and France displayed negative R&D expenditure annual growth rates. In the BES, the highest growth was reached in Portugal (29 %) and Denmark (11 %); Ireland, Luxembourg, Iceland and the UK reached the highest growth (superior to 20 %) in the GOV. Finally, in the HES, R&D expenditure rose the most for Luxembourg (63 %) and Ireland (17 %) — Table 2.

By institutional sector, the BES counts for the biggest proportion at the EU level (65 %) even if it does not reach the level of the United States (73 %) and Japan (71 %). For 10 EEA countries, the BES accounts for at least 60 % of total R&D expenditure — Figure 3.

Table 1: R&D expenditure as a % of GDP, by institutional sector — 1999-2002

	EU-15	BE	DK	DE	EL	ES	FR	IE	IT	LU	NL	AT	PT	FI	SE	UK	EEA	IS	NO	JP	US
<b>All sectors</b>																					
2002	1.99 s	:	:	:	:	:	2.20 e	:	:	:	:	1.94	:	3.49 f	:	1.84 f	1.98 s	3.11 f	:	:	2.80 e
2001	1.98 s	2.17 ep	2.40	2.49 e	:	0.96 r	2.23 p	1.17	:	:	:	1.90	0.84 e	3.40	4.27	1.89 r	1.97 s	3.08	1.62	:	2.82
2000	1.95 s	2.04 ep	2.26 er	2.49 e	:	0.94 er	2.18	1.15	1.07	1.71 r	1.94	1.84 e	:	3.40	:	1.85 r	1.95 s	2.77 e	:	2.98	2.72
1999	1.92 s	1.96 er	2.10 r	2.44 r	0.67 e	0.88	2.18	1.20 e	1.04 r	:	2.02 r	1.85 e	0.75 r	3.23	3.65	1.85	1.92 s	2.39	1.65	2.94	2.65
<b>Business enterprise</b>																					
2002	1.30 s	1.63 ep	:	:	:	:	1.37 e	:	:	:	:	:	:	2.47 f	:	1.19 f	1.29 s	1.78 f	:	:	2.04 e
2001	1.30 s	1.60 ep	1.65	1.76 e	:	0.50 r	1.41 p	0.80	0.56	:	1.08 p	:	0.27 e	2.42	3.31	1.28 r	1.29 s	1.81	0.97	:	2.10
2000	1.27 s	1.48 ep	1.51 er	1.75 e	:	0.50 er	1.36	0.83	0.53	1.58 r	1.11	:	:	2.41	:	1.21 r	1.27 s	1.56 e	:	2.11	2.04
1999	1.25 s	1.40 e	1.33 r	1.70 r	0.19 r	0.46	1.38	0.87	0.51 r	:	1.14 r	1.13 r	0.17	2.20	2.74	1.25	1.24 s	1.12	0.92	2.08	1.98
<b>Government</b>																					
2002	0.26 s	:	:	:	:	:	0.37 e	:	:	:	:	:	:	0.37 f	:	0.22 f	0.26 s	0.76 f	:	:	0.21 e
2001	0.25 s	0.13 ep	0.28	0.33 e	:	0.15 r	0.37 p	0.11 p	0.22	0.15 r	0.26 p	:	0.18	0.37	0.12	0.18 r	0.25 s	0.62	0.24	:	0.20
2000	0.26 s	0.13 ep	0.28 r	0.34	:	0.15 r	0.38	0.09	0.20	0.12 r	0.27	:	:	0.38	:	0.22 r	0.26 s	0.76 e	:	0.29	0.18
1999	0.26 s	0.06 er	0.32 r	0.34 r	0.15	0.15	0.40	0.07	0.20 r	:	0.33	0.11 r	0.21 r	0.39	0.12	0.20	0.26 s	0.72	0.25	0.29	0.20
<b>Higher education</b>																					
2002	0.42 s	:	:	:	:	:	0.43 e	:	:	:	:	:	:	0.65 f	:	0.41 f	0.42 s	0.50 f	:	:	0.42 e
2001	0.41 s	0.41 ep	0.45	0.40 e	:	0.30 r	0.42 p	0.26	:	0.01 r	:	:	0.31	0.61	0.83	0.41 r	0.41 s	0.58	0.42	:	0.40
2000	0.40 s	0.40 ep	0.45 r	0.40	:	0.28 r	0.41	0.23	0.33	:	0.57	:	:	0.61	:	0.38 r	0.40 s	0.45 e	:	0.43	0.38
1999	0.39 s	0.47 er	0.43	0.40 r	0.33	0.27	0.37	0.25 e	0.33 r	:	0.53 r	0.53	0.29	0.64	0.78	0.37	0.40 s	0.50 r	0.47	0.44	0.37

Exception to the 1999 reference year — AT (BES, GOV and HES) 1998.

Sources: Eurostat, OECD.

Figure 2: R&D expenditure in constant PPS  
All sectors – 1999-2002

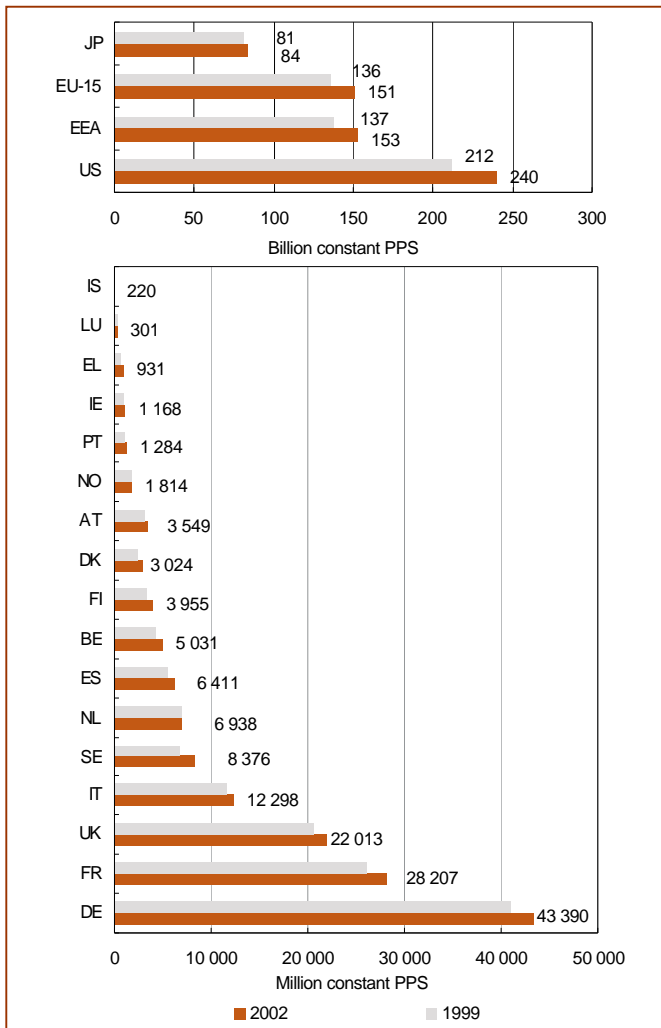
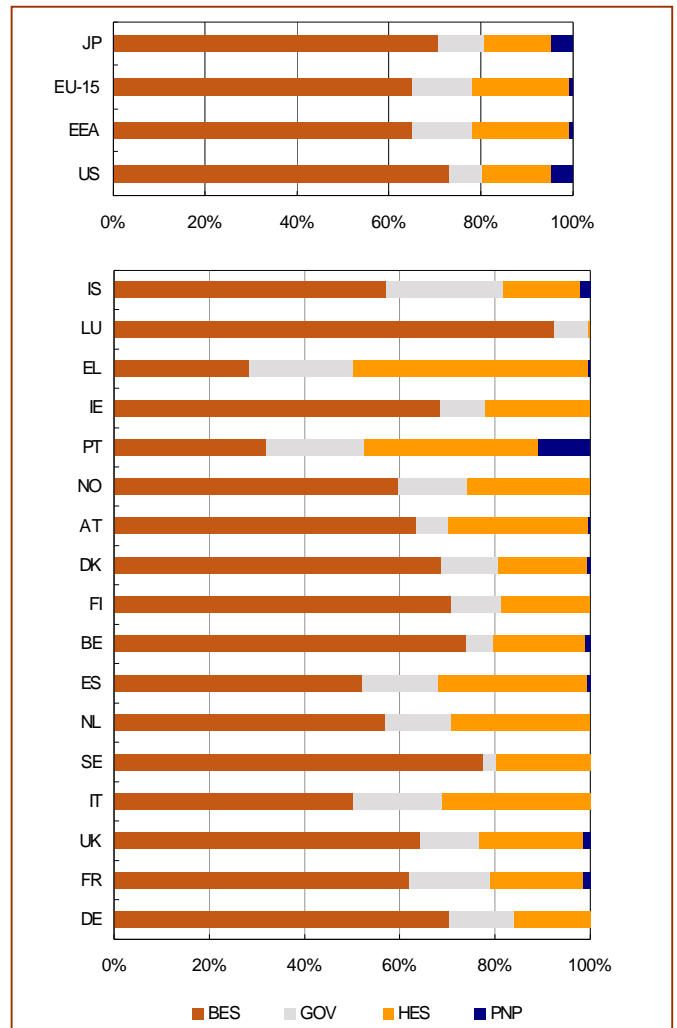


Figure 3: Percentage of R&D expenditure in constant PPS  
by institutional sector – 2002



Figures 2 and 3

- Exceptions to the 2002 reference year BE, DK, DE, ES, IE, PT, SE and NO: 2001; IT, LU, NL and JP: 2000; EL: 1999; AT: 1998 (for Figure 3 only).
- Exceptions to the 1999 reference year LU: 2000; EL: 1997.

Sources: Eurostat, OECD.

Table 2: Annual growth rate for R&D expenditure in %, on basis of constant PPS, by institutional sector — 1999-2002

	EU-15	BE	DK	DE	EL	ES	FR	IE	IT	LU	NL	AT	PT	FI	SE	UK	EEA	IS	NO	JP	US
<b>All sectors</b>																					
2002	1.9 s	:	:	:	:	:	-0.3 e	:	:	:	:	3.3	:	4.2 f	:	-1.1 f	1.9 s	0.7 f	:	:	2.3
2001	3.6 s	7.2 ep	7.4	0.4 e	:	4.5 r	4.5 p	7.4	:	:	:	4.2	8.6 e	0.8	:	4.8 r	3.5 s	14.2	1.0	:	4.0
2000	5.4 s	7.8 ep	11.2 er	5.3 e	:	10.6 er	3.8	5.6	5.9	:	-0.8	2.6 e	:	10.8	:	3.1 r	5.4 s	22.2 e	:	3.8	6.4
1999	5.4 s	6.5 er	4.5 r	7.4 r	19.4 e	3.1	3.7	6.3 e	-0.9 r	:	8.4 r	6.8 e	:	16.0	5.5	4.3	5.4 s	20.0	:	0.6	6.1
<b>Business enterprise</b>																					
2002	1.4 s	3.0 ep	:	:	:	:	-1.8 e	:	:	:	:	:	:	3.6 f	:	-5.3 f	1.4 s	-2.2 f	:	:	0.4
2001	4.4 s	8.5 ep	10.8	0.7 e	:	2.0 r	5.5 p	2.4	7.2	:	-1.0 p	:	28.6 e	1.1	:	7.7 r	4.5 s	19.3	4.3	:	2.8
2000	5.7 s	9.6 ep	17.0 er	6.1 e	:	14.2 er	2.7	4.1	7.5	:	0.4	:	:	15.3	:	-0.3 r	5.7 s	47.6 e	:	4.2	7.0
1999	7.6 s	7.5 e	2.4 r	10.3 r	26.0 r	2.9	5.2	7.8	1.1 r	:	12.8 r	9.2	:	17.7	4.0	7.4	7.5 s	52.9	:	0.0	6.5
<b>Government</b>																					
2002	3.5 s	:	:	:	:	:	1.7 e	:	:	:	:	:	:	2.7 f	:	22.8 f	3.4 s	23.0 f	:	:	11.0
2001	-0.7 s	4.0 ep	1.2	-0.7 e	:	4.9 r	0.2 p	26.9 p	9.8	23.6 r	-1.6 p	:	-6.4	-2.8	:	-16.3 r	-0.8 s	-16.3	-1.7	:	6.5
2000	3.5 s	100.8 ep	-8.2 r	3.9	:	3.7 r	-0.9	43.5	4.3	:	-17.2	:	:	2.9	:	16.9 r	3.4 s	10.9 e	:	4.2	-3.8
1999	-1.5 s	2.7 er	10.7 r	0.8 r	14.9	7.0	0.9	-12.3	-5.9 r	:	-4.1 i	-0.2	:	11.7	2.5	-16.1	-1.5 s	-2.9	:	7.3	1.6
<b>Higher education</b>																					
2002	2.7 s	:	:	:	:	:	2.8 e	:	:	:	:	:	:	7.2 f	:	1.6 f	2.6 s	-13.9 f	:	:	7.3
2001	3.7 s	3.2 ep	0.9	0.0 e	:	9.1 r	5.2 p	17.4	:	62.8 r	:	:	:	5.9	2.0	:	3.6 s	32.1	-4.4	:	6.6
2000	6.2 s	-10.5 ep	9.0 r	2.9	:	8.8 r	13.4	0.1	4.4	:	10.3	:	:	0.3	:	6.8 r	6.0 s	-5.0 e	:	1.6	6.5
1999	3.8 s	4.5 er	5.6	1.7 r	18.1	1.8	1.1	7.6 e	-0.7 r	:	4.7 r	3.0	:	16.6	11.3	7.2	3.9 s	0.5 r	:	0.6	5.0

- PT and NO — the percentage corresponds to the annual average growth rate between 1999 and 2001.
- EL — annual average growth rate: 1997-99.
- AT (BES, GOV and HES) — annual average growth rate: 1993-98.

Sources: Eurostat, OECD.

***In terms of fields of science, most R&D expenditure is carried out in Natural sciences, Engineering and technology and Medical sciences***

R&D expenditure broken down by fields of science shows the national specificities in terms of public scientific research covering both the government (GOV) and the higher education sector (HES).

In the GOV in 2001, two scientific fields accounted for the biggest proportion of R&D expenditure among the EEA countries; *Natural sciences (NAT)* in Germany, Spain, Portugal and Norway, and *Engineering and technology (ENG)* in Belgium, Luxembourg and Finland. Two countries stand apart; Denmark dedicates most of its R&D expenditure to *Medical sciences (MED)*, whereas *Agricultural sciences (AGR)* represents the most for Iceland.

The weight for the most important field of science in terms of R&D expenditure varies from one country to another, from 48 % in Germany (NAT) to 24 % in Norway (NAT). As shown in Table 3, the breakdown by fields of science is more or less balanced amongst countries. R&D expenditure is much more concentrated in Germany where NAT and ENG represent 75 % of the total than for Portugal where it is more dispersed: three fields of science each account for more than 25 % for instance.

In the HES, 6 countries carry out most of their R&D expenditure in the NAT, against 3 countries for MED and 2 countries for ENG. In contrast to the GOV, R&D expenditure is more balanced between scientific fields.

Table 3: Percentage of R&D expenditure by fields of science (in mio EUR), GOV and HES — 2001

	BE	DK	DE	ES	IE	LU	NL	PT	FI	SE	UK	IS	NO
<b>Government</b>													
Natural sciences	19 e	21	48	31	:	9	:	28	14 i	:	96 i	17	24
Engineering and technology	38 e	11	27	18	:	39	:	25	38 i	:	:	19	17
Medical sciences	6 e	35	7	23	:	9	:	10	13 i	:	:	13	9
Agricultural sciences	26 e	21	6	23	:	1	:	23	17 i	:	:	40	22
Social sciences	1 e	5	5	3	:	22	:	10	11 i	:	4 i	5	23
Humanities	10 e	6	8	3	:	0	:	4	2 i	:	:	6	5
Not classified	:	:	:	:	:	19	:	:	5 i	:	:	:	:
Total	100 e	100	100	100	:	100	:	100	100 i	:	100	100	100
<b>Higher education</b>													
Natural sciences	19 e	31	29	37	36	12	19	31	27	18	:	20	21
Engineering and technology	31 e	15	20	23	25	7	21	21	20	25	:	34	12
Medical sciences	23 e	13	25	13	8	4	28	8	24	29	:	12	30
Agricultural sciences	8 e	7	4	6	2	:	6	8	2	5	:	9	5
Social sciences	13 e	18	9	15	20	33	24 i	24	18	13	:	16	22
Humanities	6 e	16	12	7	9	6	:	8	8	6	:	10	11
Not classified	:	:	:	:	:	38	3 b	:	:	3	:	:	:
Total	100 e	100	100	100	100	100	100 i	100	100	100	:	100	100

Exceptions to the 2001 reference year

GOV — BE: 1999; DE: 2000;

HES — BE: 1999; DE, IE and NL: 2001.

Information *i*

GOV — FI: GOV includes the PNP sector; UK: Joint figures of NAT, ENG, MED, AGR;

HES — NL: Joint figures of SOC and HUM.

Sources: Eurostat, OECD.

## R&D personnel

***In 2002, 1.39 % of the labour force in the EU-15 worked in R&D***

This level remained stable compared to the previous year for all the sectors except for the HES for which an increase of 0.01 percentage points was observed.

At the national level and still for all sectors, the Nordic countries, led by Iceland (3.09 %), employed the highest share of R&D personnel as a percentage of the labour force. For the Nordic countries, this proportion was more than 2 % of the labour force, far above the EU average.

Compared to the previous year, the number of R&D personnel as a proportion of the labour force increased also for most countries apart from Ireland, the Netherlands, Sweden and Iceland, even if for these latter, the decrease remained lower than 0.17 percentage points.

Over a longer period, between 1999 and 2001, the most growth in R&D personnel as a percentage of the labour

force given in percentage points occurred in Iceland (0.56 percentage points), Denmark (0.22) and Belgium (0.21). For this period, the gap between the top country in the EEA and the last widened from 1.99 percentage points to 2.52 — Table 4.

***The EU-15 employed 1.83 million in full-time equivalent (FTE) R&D personnel in 2002, which represented an increase of 1.6 % compared to 2001***

Almost 50% of the R&D personnel were concentrated in 2 countries, Germany and France, by decreasing order. Both countries showed a positive annual growth (respectively 0.5 % and 2.2 %) which remains inferior to the top annual growths displayed by Iceland (10.3 %), Denmark and Belgium (6.6 %). Only two countries recorded a decrease in their R&D personnel: Sweden (-2.5 %) and Luxembourg (-33.8 %) — Tables 5 and 6.

Table 4: R&D personnel as a % of the labour force (in head count), by institutional sector — 1999-2002

	EU-15	BE	DK	DE	EL	ES	FR	IE	IT	LU	NL	AT	PT	FI	SE	UK	EEA	IS	NO
<b>All sectors</b>																			
2002	1.39 s	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	1.42 s	3.09 f	:
2001	1.39 s	1.73 s	2.11	1.61 s	:	1.18	:	:	:	:	:	:	0.74 e	2.60	2.43	:	1.42 s	3.26	2.04
2000	1.37 s	1.60 s	1.96 e	1.61 s	:	:	:	0.94 s	:	:	1.52 s	:	:	2.58	:	:	1.39 s	2.92 e	:
1999	1.33 s	1.52 s	1.89 r	1.59 s	1.28	1.04	1.51	0.95 s	0.92	:	1.54 s	1.38	0.71 r	2.53	2.45	:	1.36 s	2.70 r	1.88
<b>Business enterprise</b>																			
2002	0.67 s	0.97 s	:	:	:	:	:	:	:	:	:	:	:	:	:	0.56 s	0.67 s	1.12 f	:
2001	0.67 s	0.97 s	1.20	0.92 s	:	0.31	:	0.59 s	:	:	:	:	0.13 e	1.42	1.17	0.59 s	0.67 s	1.22	0.87
2000	0.65 s	0.88 s	1.12 e	0.92 s	:	:	:	0.58 s	0.32	:	0.77	:	:	1.43	:	0.56 s	0.65 s	1.03 e	:
1999	0.63 s	0.83 s	1.03 r	0.90 s	0.19	0.27	0.73	0.57 s	0.29	:	0.78	0.65	0.11	1.38	1.14	0.60 s	0.64 s	0.88 r	0.75
<b>Government</b>																			
2002	0.17 s	:	:	:	:	:	:	:	:	:	:	:	:	:	:	0.09 s	0.18 s	0.81 f	:
2001	0.17 s	0.11 s	0.35	0.24 s	:	0.18	:	0.11 s	:	0.20	:	:	0.16	0.38 i	0.12	0.08 s	0.18 s	0.84	0.27
2000	0.18 s	0.11 s	0.32 r	0.24 s	:	0.17	:	0.10 s	0.18	0.18	0.18	:	:	0.38 i	:	0.11 s	0.18 s	0.81 e	:
1999	0.18 s	0.07 s	0.38	0.24 s	0.18	0.17	0.20	0.06 s	0.18	:	0.23	0.15	0.18 r	0.40	0.12	0.11 s	0.19 s	0.81 r	0.27
<b>Higher education</b>																			
2002	0.54 s	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	0.56 s	0.91 f	:
2001	0.53 s	0.63 s	0.54	0.45 s	:	0.68	:	:	:	0.03	:	:	0.36	0.80	1.14	:	0.55 s	0.95	0.89
2000	0.52 s	0.60 s	0.51 r	0.45 s	:	0.64	:	0.26 s	:	0.02	0.55 s	:	:	0.77	:	:	0.54 s	0.92 e	:
1999	0.51 s	0.61 s	0.49	0.45 s	0.91	0.59	0.54	0.32 s	0.45	:	0.52 s	0.57	0.34	0.76	1.19	:	0.52 s	0.91 r	0.86

- Exceptions to the 1999 reference year  
- Information i

FR and AT: 1998, UK (all sectors): 1993.  
FI (GOV) includes the PNP sector.

Source: Eurostat.

Table 5: R&D personnel in FTE, by institutional sector — 1999-2002

	EU-15	BE	DK	DE	EL	ES	FR	IE	IT	LU	NL	AT	PT	FI	SE	UK	EEA	IS	NO	JP
<b>All sectors</b>																				
2002	1 629 635 s	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	1 859 371 s	:	:	:
2001	1 801 182 s	55 898 ep	39 893	487 378 e	:	125 750	333 517	:	:	2 418 p	:	:	22 970 e	53 424	72 087	:	1 830 698 s	2 919	26 598	:
2000	1 765 827 s	52 831 ep	37 693 e	484 734 e	:	120 618 e	326 442 r	12 762	150 066	3 654	88 461	:	:	52 604	:	:	1 794 468 s	2 646 e	:	896 847
1999	1 712 942 s	49 477 e	35 652 r	480 415 r	26 382	102 237	:	12 289 e	142 506	:	87 022	31 308	20 806 r	50 605	66 674	277 500	1 740 735 s	2 390 r	25 402	919 132
<b>Business enterprise</b>																				
2002	1 014 244 s	35 875 f	:	:	:	:	:	:	:	:	:	:	:	:	:	146 000 f	1 030 103 s	:	:	:
2001	999 548 s	35 489 ep	25 849	314 330 e	:	46 465	185 468	9 126	:	2 029 p	60 105 p	:	3 875 e	30 090	49 433	151 766	1 015 246 s	1 346	14 352	:
2000	971 850 s	32 965 ep	23 725 e	312 490 e	:	47 055 e	180 986 r	8 724	63 998	3 337	47 509	:	:	29 384	:	145 497 r	986 828 s	1 147 e	:	581 721
1999	938 517 s	30 868 e	21 824 r	306 693 r	4 577	38 323	171 564	8 321	59 646	:	45 181 r	20 385	3 260	27 818	44 170	152 865	952 788 s	961 r	13 310	604 544

- Exception to the 1999 reference year  
- Information i

AT: 1998.  
FI (GOV) includes the PNP sector.

Source: Eurostat.

Table 6: Annual growth rate for the R&D personnel in FTE, by institutional sector — 1999-2002

	EU-15	BE	DK	DE	EL	ES	FR	IE	IT	LU	NL	AT	PT	FI	SE	UK	EEA	IS	NO	JP
<b>All sectors</b>																				
2002	1.6 s	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	1.6 s	:	:	:
2001	2.0 s	5.8 ep	5.8	0.5 e	:	4.3	2.2	:	:	-33.8 p	:	:	5.1 e	1.6	:	:	2.0 s	10.3	2.3	:
2000	3.1 s	6.8 ep	5.7 e	0.9 e	:	18.0 e	:	3.8	5.3	:	1.7	:	:	4.0	:	:	3.1 s	10.7 e	:	-2.4
1999	2.7 s	6.6 e	1.3 r	4.1 r	:	5.3	:	5.8 e	-2.4	:	1.8	:	:	8.8	-2.5	:	2.7 s	5.1 r	:	-0.7
<b>Business enterprise</b>																				
2002	1.5 s	1.1 f	:	:	:	:	:	:	:	:	:	:	:	:	:	-3.8 f	1.5 s	:	:	:
2001	2.9 s	7.7 ep	9.0	0.6 e	:	-1.3	2.5	4.6	:	-39.2 p	26.5 p	:	9.0 e	2.4	:	4.3	2.9 s	17.3	3.8	:
2000	3.6 s	6.8 ep	8.7 e	1.9 e	:	22.8 e	5.5 r	4.8	7.3	:	5.2	:	:	5.6	:	-4.8 r	3.6 s	19.4 e	:	-3.8
1999	3.7 s	5.5 e	3.0 r	6.5 r	:	10.5	2.0 i	8.8	-2.4	:	3.0 r	:	:	11.2	-5.5	2.1	3.7 s	5.0 r	:	-1.4

- PT and NO: the percentage corresponds to the annual average growth rate between 1999 and 2001.

Source: Eurostat.

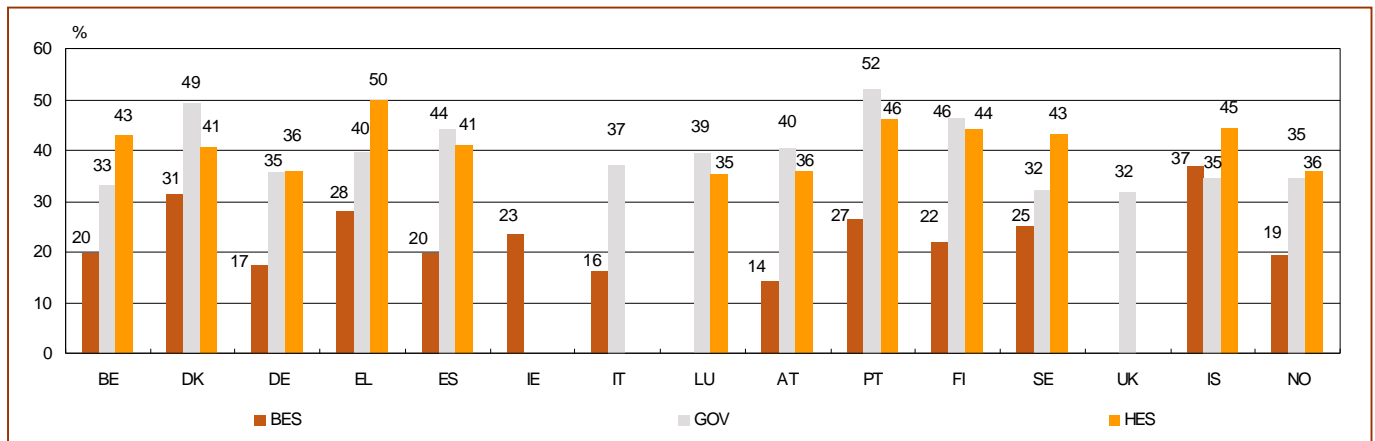
**Women researchers are less represented in the EU than men particularly in the BES.**  
**Parity is reached in Portugal (GOV, 52 %), Greece (HES, 50 %) and Denmark (GOV, 49 %)**

female representation by the researchers is below 20 % for 4 countries, Austria, Germany, Italy and Norway in contrast to the public sectors, GOV and HES, where the inferior threshold is 33 % — Figure 4.

In 2001, the public sector employed the biggest proportion of women researchers in the EU, especially the HES for which this percentage was superior to 40 % in 8 countries. In the GOV, this number falls to 6 countries for the same proportion, whereas in the BES only 2 countries had a share of female researchers over 30 %. For this latter sector, which is the most important in terms of weight, the top values are observed for Iceland (37 %) and Denmark (31 %). In the BES also, the

By fields of science, on average the proportion of researchers as a share of total R&D personnel is higher in the HES than in the GOV — Table 7. The fields of science employing the biggest share of these researchers were *Social sciences (SOC)* and *Humanities (HUM)* in 2001. The highest shares were reached in Portugal in SOC for the GOV and *Natural sciences* for the HES.

Figure 4: Proportion of female researchers in FTE or HC BES, GOV and HES — 2001



- Exceptions to the 2001 reference year — UK: 2002; DK: 2000; EL: 1999; IT and AT: 1998.
- Data for LU, FIN and NO: head count (HC).
- The percentage of women represents the ratio: number of women divided by the total of women plus men.

Source: Eurostat.

Table 7: Researchers in FTE as a proportion of total R&D personnel by fields of science GOV and HES, in the EEA countries — 2001

	DK	DE	ES	IE	NL	PT	SE	IS	NO
<b>Government</b>									
Natural sciences	73	53	56 e	:	:	58 e	:	:	62
Engineering and technology	72	58	46 e	:	:	60 e	:	:	52
Medical sciences	58	45	73 e	:	:	87 e	:	:	71
Agricultural sciences	58	40	48 e	:	:	42 e	:	:	52
Social sciences	76	58 i	57 e	:	:	97 e	:	:	83
Humanities	79	:	64 e	:	:	79 e	:	:	73
Not classified	:	:	:	:	:	::	:	:	:
Total	64	53	57	:	:	60 e	:	:	65
<b>Higher education</b>									
Natural sciences	68	74	85 e	83	59	99	80	78	76
Engineering and technology	83	70	86 e	69	63	83	74	78	78
Medical sciences	53	36	86 e	70	67	66	65	68	70
Agricultural sciences	60	62	86 e	45	64	71	70	71	64
Social sciences	86	85	87 e	96	54 i	91	86	68	81
Humanities	91	87	88 e	97	:	95	89	73	83
Not classified	:	:	:	:	:	:	85	:	:
Total	74	66	86	83	59	88	76	73	76

- Exceptions to the 2001 reference year BE, DE and SE: 1999; IE, NL and PT (GOV): 2000.
- Information i DE and NL: Joint figures of SOC and HUM for which no breakdown is available.

Source: Eurostat.



## Ø ESSENTIAL INFORMATION – METHODOLOGICAL NOTES

### Research and experimental development — R&D

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.

- The business enterprise sector — BES

With regard to R&D, the business enterprise sector includes: all firms, organisations 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: 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

- 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, 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.

- Labour force

The labour force is the active population. It is defined as the sum of employed and unemployed persons.

### R&D indicators: R&D 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.

- Purchasing power standards— PPS

Purchasing power parities are based on comparisons of the prices of representative and comparable goods or services recorded in the national currency of the country in question on a specific date. As a result, financial aggregates can be expressed in purchasing power standards—PPS—rather than EUR based on exchange rates.

- Current PPS

Data quoted in current PPS are obtained by applying the average exchange rate of the year in question to the national currency value.

- Constant 1995 PPS

Data presented in this SIF under 'constant PPS' refers to 1995 constant PPS at 1995 prices. Data measured in constant 1995 PPS are first corrected for inflation using the GDP deflator — a Paasche index based on 1995=100 — of the country in question before applying the 1995 PPS exchange rate. The GDP deflator broadly correlates with the 1995 European System of Accounts (ESA 95) available on NewCronos, Theme 2. The adjusted GDP deflator provided for by ESA 79 was used in the case of incomplete series.

- R&D intensity

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

### Fields of science

The classification by fields of science is based on the nomenclature suggested by Unesco: Recommendation concerning the International Standardisation of Statistics on Science and Technology — see the Frascati Manual sections 4.4, 3.6.2 and 3.7.2.

### European aggregates

For both R&D expenditure and 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.

EEA: does not include Liechtenstein.

### Sources

United States and Japan: OECD, Main Science and Technology indicators – MSTI 2002/2.

### General abbreviations

p	provisional value
e	estimated value
s	Eurostat estimate
r	revised value
f	forecast
b	break in series
:	not available

### Reference manual

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

# Further information:

## Reference publications

Title Statistics on science and technology  
 Catalogue No KS-CT-02-001-EN-C Price EUR 29.50

## Databases

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