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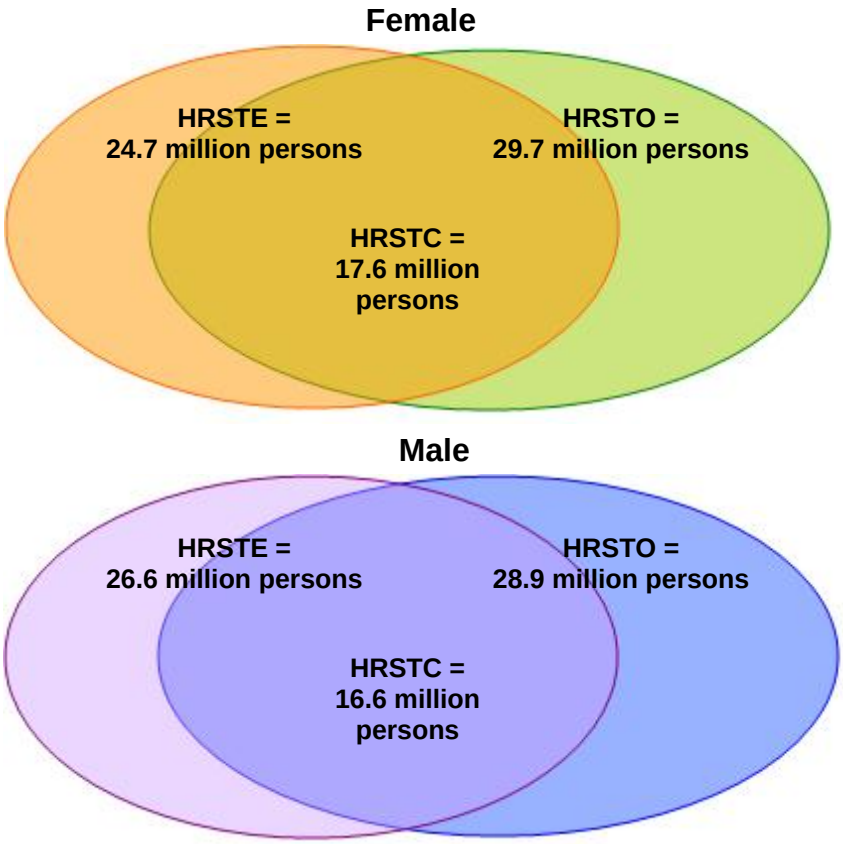
Women employed in science and technology

This issue of Statistics in Focus takes a detailed look at certain aspects of employment for women in science and technology.

Increasing the human resources in science and technology is a key objective in order to meet the target set by the Lisbon summit in 2000 of making Europe the most competitive and dynamic knowledge-based economy in the world. One way of achieving this is by using the existing pool of highly trained women. Having a clearer picture of the employment situation for women in science and technology will then be of utmost importance in order to implement European action in this area better.

Employed human resources in science and technology (HRST) by sub-population and gender

Figure 1: Employed human resources in science and technology (HRST) aged 25-64 by sub-population and gender in the EU, 2006



EU-27 estimates with 2005 data for BE and IE.
For definitions of HRST, see methodological notes (p. 7).

Source: Eurostat HRST statistics

In 2006 the human resources in science and technology (HRST) aged 25-64 employed in the EU totalled 75.7 million. As shown in Figure 1, the EU distribution varies slightly by gender.

Out of the number of employed HRST with tertiary education (HRSTE), 48% were female. In terms of occupation (HRSTO) the share of females was near parity at 51%. However, women appear to be more successful at finding a job that matches their qualifications, as 48% of all employed female HRST had completed tertiary education and were employed as professionals or technicians (HRSTC) against 43% for men.

In Lithuania 72% of workers in an S&T occupation were female

Table 2: Employed female HRSTO aged 25-64 in 2006, by sector of economic activity, in thousands, plus female share and annual average growth rate 2001-2006, in the EU and selected countries

	All sectors			Manufacturing sector			Services sector		
	In 1 000s	Female share (%)	Annual average growth rate 2001-2006 (%)	In 1 000s	Female share (%)	Annual average growth rate 2001-2006 (%)	In 1 000s	Female share (%)	Annual average growth rate 2001-2006 (%)
EU-27	29 730 s	50.8 s	3.5 s	2 229 s	30.4 s	2.4 s	26 694 s	55.3 s	3.6 s
BE	619	48.0	4.3	38	22.6	6.1	572	53.7	4.0
BG	396	62.4	-0.5	34	50.7	-4.6	348	65.8	0.3
CZ	774	52.8	2.9	104	39.7	5.4	628	59.8	2.8
DK	525	53.4	3.5	41	36.6	3.2	476	56.9	3.4
DE	6 228	49.9	2.6	498	26.2	0.3	5 575	55.6	2.7
EE	106	69.7	3.6	9 u	60.0 u	-2.1 u	92	71.9	4.5
IE	207	51.8	7.3	14	30.4	11.7	190	56.9	6.8
EL	471	48.6	6.9	23	35.4	10.4	444	50.1	6.7
ES	2 143	48.3	7.7	148	30.5	5.0	1 934	51.8	7.9
FR	3 346	47.2	2.9	199	22.2	-0.3	3 092	52.6	3.1
IT	3 206	47.3	5.4	279	29.4	10.9	2 866	51.3	4.9
CY	38	44.7	4.8	2	50.0	14.9	35	46.1	4.6
LV	162	64.8	2.0	9	50.0	-9.7	144	67.3	2.7
LT	254	72.0	2.8	20 u	62.5 u	3.3 u	224	74.9	2.6
LU	35	47.3	8.8	1 u	33.3 u	0.0 u	34	49.3	9.1
HU	597	60.5	3.0	46	43.4	0.4	534	64.1	3.1
MT	14	40.0	7.0	u	u	u	13	43.3	5.4
NL	1 350	49.7	3.2	54	26.3	2.4	1 233	53.1	2.9
AT	511	47.5	4.9	42	26.8	19.8	458	52.8	3.7
PL	2 187	61.1	2.8	184	43.5	:	1 906	65.7	:
PT	437	51.9	4.8	27	35.5	2.4	402	55.0	5.0
RO	947	57.3	2.3	126	49.8	-1.2	753	61.9	3.1
SI	159	55.6	6.3	21	38.2	3.1	135	63.1	7.3
SK	370	58.4	1.8	44	45.4	0.9	308	63.8	2.1
FI	430	54.5	-1.1	41	35.0	1.0	382	60.2	-1.4
SE	847	51.6	2.6	50	30.1	-0.4	784	55.4	2.8
UK	3 371	48.6	3.7	175	25.6	0.7	3 132	52.8	3.8
IS	27	55.1	4.1	1	33.3	:	26	59.1	4.3
NO	395	50.0	2.1	13	23.6	-5.1	375	53.5	2.5
CH	628	45.0	2.9	35	22.6	5.3	583	48.7	2.7

Source: Eurostat HRST statistics

Eurostat estimate: EU-27.
Exceptions to the reference year: BE, IE, IS and NO 2005. For AAGR, exceptions to the reference period: BE, IE, IS and NO 2001-2005.
Break in series in 2006 for all countries except BE and LU.
National figures can vary slightly compared with Map 4.

As can be seen from Table 2, in the EU 29.7 million females aged between 25 and 64 were working in an S&T occupation (HRSTO) in 2006. This gives women a share of 50.8%.

The highest proportion of females employed in S&T was found in Lithuania (72.0%), followed by Estonia (69.7%). In the majority of the EU Member States (15 out of 27) more than 50% of the HRSTO were female. At the other end of the scale, Malta showed the smallest proportion with only 40.0%. In absolute numbers, Germany had the largest population of female HRSTO with 6.2 million women.

Despite their high shares of female HRSTO, Bulgaria and Finland showed declines between 2001 and 2006 with annual average growth rates (AAGR) of -0.5% and -1.1% respectively. During the same period Malta, with the smallest share of women occupied in S&T, scored one of the highest AAGR (+7.0%), behind Luxembourg, Spain and Ireland.

Variations can also be seen between the individual sectors of economic activity. In 2006 the vast majority of the EU's female HRSTO were working in services (27 million against only 2 million in manufacturing). In the services sector, women clearly predominated, as in 24 of the 27 EU Member States female HRSTO took a higher share than males. For example, in Lithuania only 25% of the HRSTO working in the services sector were male. Only Finland showed a decline in female HRSTO in the service sector between 2001 and 2006.

In the manufacturing sector, the lack of female HRSTO was marked. At EU level only 30.4% of the HRSTO working in this sector were women. Only five EU Member States reported a proportion of female HRSTO of 50% or more (Bulgaria, Cyprus, Estonia, Latvia and Lithuania).

The annual average growth rate for women in this sector varies widely between countries. For the period 2001-2006, Austria had an AAGR of +19.8%, while six EU Member States recorded a negative AAGR. Latvia recorded the lowest AAGR with -9.7%.

In Malta and Cyprus two out of every five female HRSTO were aged between 25 and 34

Figure 3 illustrates the national distribution by age groups for the female HRST employed in an S&T occupation (HRSTO). Females below 45 years of age predominate among the HRSTO in the EU. Of the 29.7 million women employed in an S&T occupation, 31% were aged between 25 and 34 and 32% between 35 and 44.

But even if the share of younger women among the female HRSTO at EU level is high, national disparities can be seen in Figure 3.

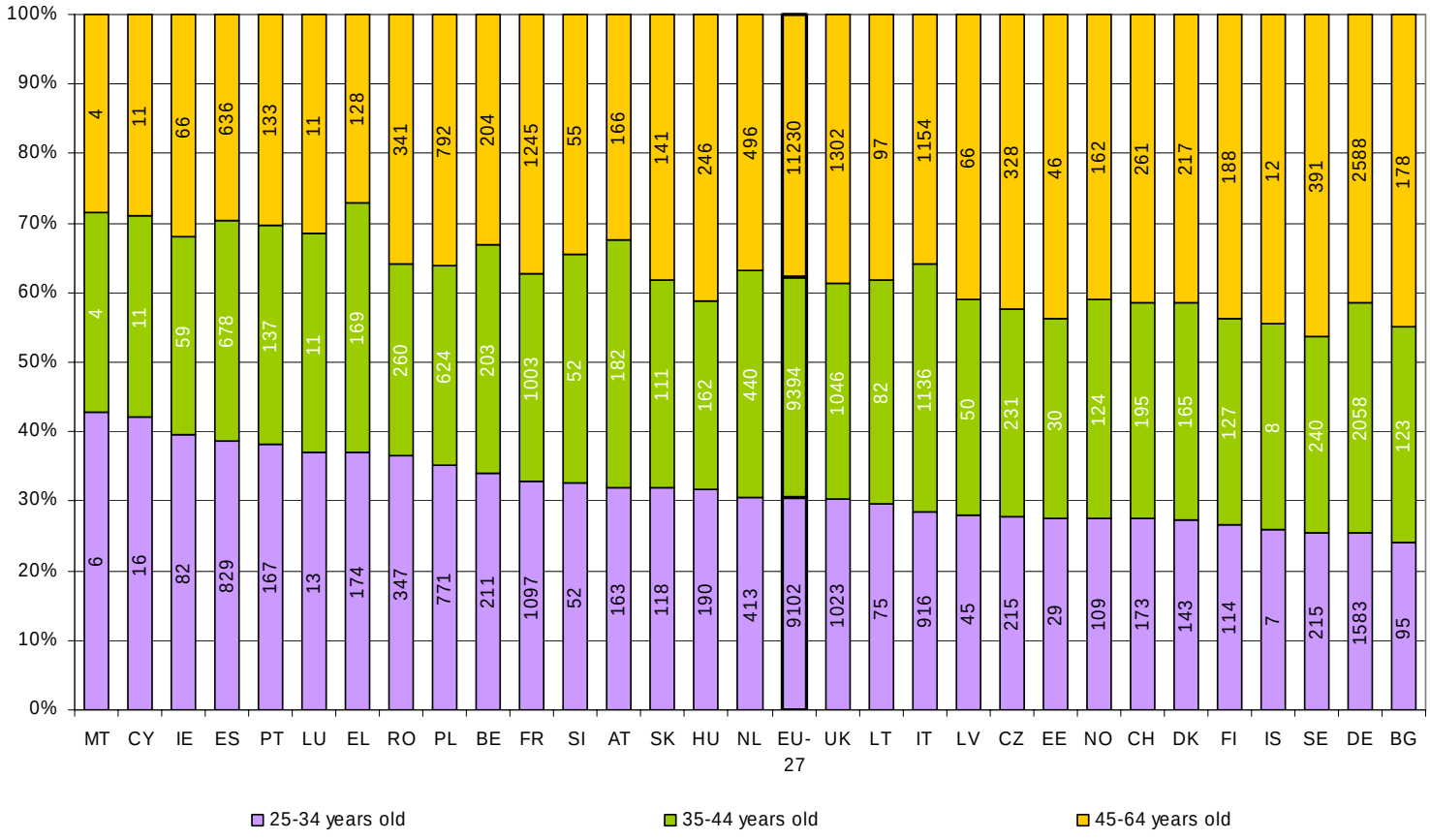
The highest share of female HRSTO aged 25-34 is found in Malta, closely followed by Cyprus. These two countries display a relatively young female population employed in S&T occupations, with more than 42% of female HRSTO aged 25-34 years. This could be the result of gradual recognition of the role of women in S&T occupations and an interest in increasing their representation in research and other knowledge-based jobs. Linking this to the results in Table 2, where these two countries showed the lowest shares of women among HRSTO, it appears that they are catching up with the others in the number of women employed in S&T.

At the other end of the scale, in Bulgaria only 24% of the females working in S&T occupations fell into the 25-34 age group. In fact, almost 45% of Bulgarian women employed in S&T were aged between 45 and 64.

However, Sweden was the EU Member State with the relatively oldest female population employed in S&T, as more than 46% (391 000) of its female HRSTO were aged between 45 and 64 in 2006. Many other countries, among them Iceland, Finland and Estonia, also had a high share of their female HRSTO in the 45-64 age group. These results illustrate the ageing of the female HRSTO in the north of Europe.

Finally, Greece is the EU Member State with the smallest share of female HRSTO in the 45-64 age group (27%). Like Cyprus and Malta, Greece and other countries in southern Europe are also experiencing a change in the traditional employment pattern, with young females increasing their presence in S&T occupations.

Figure 3: Employed female HRSTO aged 25-64, by age group, in the EU and selected countries, 2006

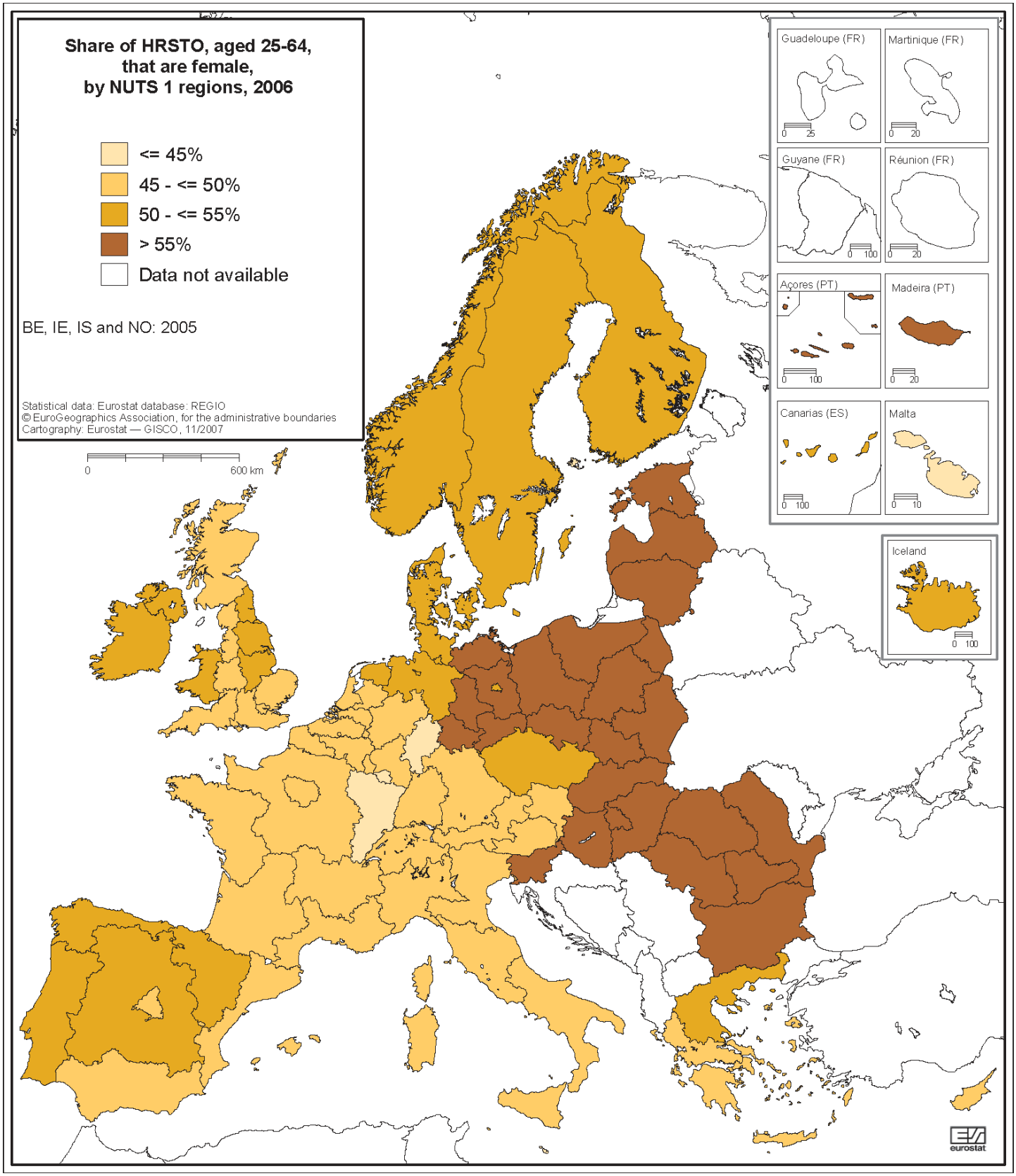


Eurostat estimates: EU-27.
Exceptions to the reference year: BE, IE, IS and NO 2005.

Source: Eurostat HRST statistics

Female shares of HRSTO aged 25-64 by region

Map 4: Female share of HRSTO aged 25-64, by NUTS 1 region, in the EU and selected countries, 2006



Regions in eastern Europe showed the highest shares of female HRSTO

Map 4 shows the regional shares of female HRST aged between 25 and 64 working in an S&T occupation (HRSTO).

Regional differences at NUTS level 1 can clearly be seen on this map. Every region had a share of female HRSTO of at least 40% in 2006, but in the eastern European regions the shares were highest. Lithuania and Estonia (where the whole countries are counted as a single region) had the highest proportions of female HRSTO with 70.6% and 68.4% respectively. All the Polish, Romanian and Hungarian regions reported shares of female HRSTO of more than 55%.

Five German regions also had proportions of female HRSTO over 55%: Brandenburg (63.8%), Mecklenburg-Vorpommern (56.0%), Sachsen (57.9%), Sachsen-Anhalt (65.2%) and Thüringen (59.1%). However, two German regions scored below 45% in 2006 (Saarland and Hessen). A difference can be seen between the east and west of Germany: the lowest shares of female HRSTO are found in the west and the highest mainly in the east.

In mainland Spain, a difference between the south-eastern and north-eastern regions can be seen from the map. The lowest shares of female HRSTO were in the regions of Este and Sur and also the Comunidad de Madrid, with below 50%. The Noroeste, Noreste and Centro regions covering the north of the country had shares above 50%.

The Finnish region Åland had the lowest proportion of female HRSTO with 40.0%. Malta followed with a slightly higher score of 41.5%. A total of 13 Member States had at least one region with a share of females working in S&T occupations lower than parity. For example, French regions all had shares below 50%, ranging from 44.5% in Est up to 49.4% in Méditerranée.

Overall, it can be concluded that the regional variations within most countries are not very big. Only Germany and Finland show a regional variation of more than 10 percentage points.

Expanding the pool of women in science and technology

Increasing the inflow

"Future opportunities for young women scientists in industry depend to a considerable degree on the attitude of European society towards women in scientific or technical careers. Parents, friends, teachers, career officers, lecturers, professors and employers play an important role for girls and young women planning their careers. Scientific professions and careers in research should therefore be presented as attractive perspectives for young women."

Source: http://ec.europa.eu/research/science-society/women/wir/pdf/wir_proceedings_en.pdf

Decreasing the outflow

"Companies and experts have explored as a group the progress yet to be made in integrating gender diversity in S&T. They are seriously concerned about the leaky pipe-line which illustrates the difficulties for universities to attract top students of both sexes in S&T. At corporate level, they see many potential improvements in addressing the cultural change as a major transformation of the company, in preparing managers to the challenge of diversity and in cooperating with communities and employees. Specifically, they recommend the following actions:

- *To invest in the process of change management to include gender diversity, make management accountable of progress.*
- *To nourish the talent pool - expose women to challenging work experiences.*
- *To address concretely work-life balance issues, which are common to men and women.*
- *To implement internal programs as soon as possible: role models, mentoring, coaching, child care.*

These types of actions are supported by a group of leading international companies, who realise that the challenge of gender equality needs proactive attention."

Source: http://ec.europa.eu/research/science-society/pdf/wist_report_final_en.pdf

The highest unemployment rate for female HRST was in Greece

Table 5: Unemployment of HRST and non-HRST, by gender, in the EU and selected countries, 2006

	Unemployed HRST				Unemployed non-HRST			
	Female		Male		Female		Male	
	In 1 000s	Unemployment rate	In 1 000s	Unemployment rate	In 1 000s	Unemployment rate	In 1 000s	Unemployment rate
EU-27	1442 s	3.5 s	1206 s	2.8 s	7975 s	10.5 s	8695 s	8.8 s
BE	37	3.8	35	3.3	157	12.8	162	9.2
BG	20	3.6	13 u	3.0	129	11.6	144	9.8
CZ	8	1.0	9	1.1	194	9.8	160	6.5
DK	19	2.8	12	1.9	43	4.9	39	3.6
DE	208	2.6	227	2.5	1703	11.4	2109	12.6
EE	u	u	u	u	15 u	u	18	u
IE	7	2.0	7	1.9	24	4.6	45	5.5
EL	58	8.5	29	3.8	214	15.0	133	5.9
ES	271	7.1	172	4.0	774	13.8	620	7.0
FR	265	5.2	267	4.9	1065	12.0	1098	10.0
IT	121	3.2	70	1.6	751	9.3	730	5.7
CY	3	4.8	2	2.7	6	5.5	6	4.1
LV	7 u	2.8	u	u	28	7.0	41	u
LT	u	u	u	u	35	u	42	u
LU	1 u	2.5	1 u	1.6	5	7.1	3	4.0
HU	13	1.7	11	1.9	139	9.4	154	8.1
MT	u	u	u	u	4	u	7	u
NL	30	1.7	33	1.7	162	6.0	155	4.7
AT	10	1.5	9	1.1	88	5.6	88	4.9
PL	124	4.3	81	3.8	1018	17.8	1121	14.5
PT	33	5.7	15	2.9	200	9.5	179	6.8
RO	27	2.4	22	2.3	249	6.4	430	8.9
SI	5	2.5	2 u	1.5	29	8.5	24	5.5
SK	8	1.8	5	1.5	167	16.7	175	14.0
FI	19	3.0	11	2.1	101	12.5	110	11.0
SE	33	3.1	28	2.8	125	8.5	140	7.5
UK	103	1.9	132	2.2	549	5.9	759	6.8
IS	u	u	u	u	2	u	2	u
NO	9	1.7	11	2.0	42	5.9	49	5.5
CH	13	1.5	16	1.4	79	5.2	62	4.2

Exceptions to the reference year: BE, IE, IS and NO 2005.
Eurostat estimate: EU-27.

Source: Eurostat HRST statistics

Table 5 shows the national situation as regards unemployed human resources in science and technology (HRST) and unemployed non-HRST by gender in 2006.

At EU level, the results show that human resources in science and technology have a greater chance of being employed regardless of gender. However, female unemployment rates for both HRST and non-HRST are higher than male unemployment rates. In 2006 the unemployment rate for female HRST was 3.5%, whilst the unemployment rate for male HRST was 2.8%. The situation is the same for non-HRST, where the female unemployment rate was 10.5% against 8.8% for males.

At country level, the same result is found. For HRST only three of the 27 EU Member States had a slightly higher unemployment rate for males than for females: the Czech Republic, Hungary and the United Kingdom. For countries outside the EU, the same was also the case for Norway.

The United Kingdom is the only Member State where the female unemployment rate is lower for both HRST and non-HRST.

The largest gender disparities in terms of the absolute number of unemployed HRST were found in Greece, Portugal and Slovenia, where the number of female unemployed HRST was twice the figure for men.

In relative terms, the highest unemployment rate for female HRST was also found in Greece with 8.5%, followed by Spain with 7.1%. At the other end of the scale, the Czech Republic had the lowest unemployment rates for both genders (1.0% for female HRST and 1.1% for male HRST).

Poland and Slovakia had the highest unemployment rates for both female non-HRST (17.8% and 16.7% respectively) and male non-HRST (14.5% and 14.0%). In spite of this, Slovakia shows one of the EU's lowest unemployment rates for HRST for both genders (1.8% and 1.5%).

➢ ESSENTIAL INFORMATION – METHODOLOGICAL NOTES

1. HRST concepts

Human resources in science and technology (HRST) can be divided into different sub-populations, based on educational achievement and occupation, following the guidelines set out in the OECD *Canberra Manual*.

This issue of Statistics in Focus shows results for the following categories:

• HRST — Human Resources in Science and Technology
Individuals who fulfil at least one of the following conditions:
- have successfully completed tertiary-level education (ISCED '97 version, levels 5a, 5b or 6); and/or
- are working in an S&T occupation as professionals or technicians (ISCO '88, COM codes 2 or 3).

• HRSTE — Human Resources in Science and Technology in terms of Education
Individuals who have successfully completed tertiary-level education (ISCED '97 version, levels 5a, 5b or 6).

• HRSTO — Human Resources in Science and Technology in terms of Occupation
Individuals who are employed in an S&T occupation: professionals (ISCO '88, COM code 2) or technicians and associate professionals (ISCO '88, COM code 3).

• HRSTC — Core of Human Resources in Science and Technology
Individuals who have both successfully completed tertiary-level education (ISCED '97 version, levels 5a, 5b or 6) and are employed in an S&T occupation as professionals and technicians (ISCO '88, COM codes 2 or 3).

• Unemployed HRST
Individuals who have successfully completed tertiary-level education (ISCED '97 version, levels 5a, 5b or 6) and are unemployed.

• Unemployed non-HRST
Individuals who have not successfully completed tertiary-level education and are unemployed.

Remark: The "unemployment rate" in Table 5 expresses the number of unemployed HRST or non-HRST divided by the relevant labour force.

2. Data sources

The indicators presented are derived from the European Union Labour Force Survey (EU LFS). The most recent data were compiled in October 2007. In 2006 there is a break in the series for all the HRST results for all the countries except BE and LU. This break is due to a change in methodology to annual collection of certain LFS variables.

Quality of the data
The guidelines on the sample size reliability of the data, established by the EU LFS, are applied to the HRST statistics. Therefore, breakdowns for which quality levels are considered insufficient are flagged as lacking reliability due to reduced sample size.

3. Nomenclature of territorial units for statistics NUTS

The Nomenclature of Territorial Units for Statistics — NUTS — was established to provide a single, uniform breakdown of territorial units for the production of regional statistics for the EU. NUTS is a five-level hierarchical classification comprising three regional and two local levels. In this way, NUTS subdivides Member States into NUTS 1 regions, each of which is in turn subdivided into a number of NUTS 2 regions, and so on. In this publication, data are presented at NUTS 1 level. At this NUTS level, Bulgaria, the Czech Republic, Denmark, Estonia, Ireland, Cyprus, Latvia, Lithuania, Luxembourg, Malta, Slovenia, Slovakia, Sweden, Iceland, Norway and Switzerland are classified as single regions.

4. NACE

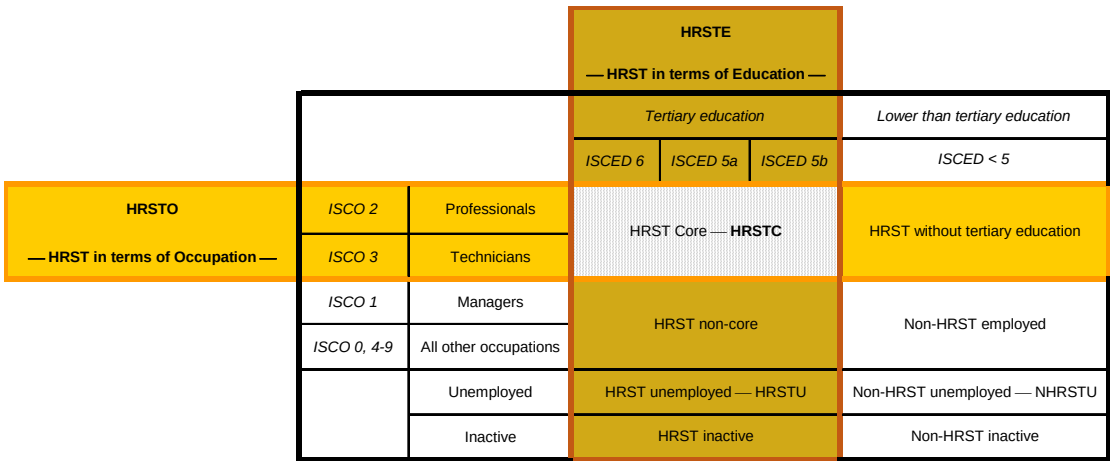
Data presented by sector of economic activity are based on the statistical classification of economic activities in the European Community, NACE Rev.1.1., with the following details *(two-digit codes refer to NACE divisions):*

Manufacturing (15 to 37);

Services (50 to 99).

5. Statistical abbreviations and symbols

: Not available
u Lack reliability due to reduced sample size
s Eurostat estimate



Further information:

Data:

Science and technology

- Human Resources in Science & Technology
  - Stocks of HRST at the national and regional levels; unemployment for HRST and non-HRST
  - Flows of HRST at the national level: Education inflows and job-to-job mobility
  - Data on HRST and mobility derived from the 2001 round of Population and Housing Censuses

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