

Highly educated persons in science and technology occupations

Regional Characteristics

The stock of human resources in science and technology (HRST) can be used as an indicator of the development of the knowledge-based economy in the EU.

The core group of this population — known as HRSTC — can be considered as active stakeholders in the development of knowledge and technological innovation. This core group is often well represented in capital regions. The share of women is highest in the Baltic countries. In some Greek and Spanish regions more than 80% of all HRST working in the education sector belong to this core group.

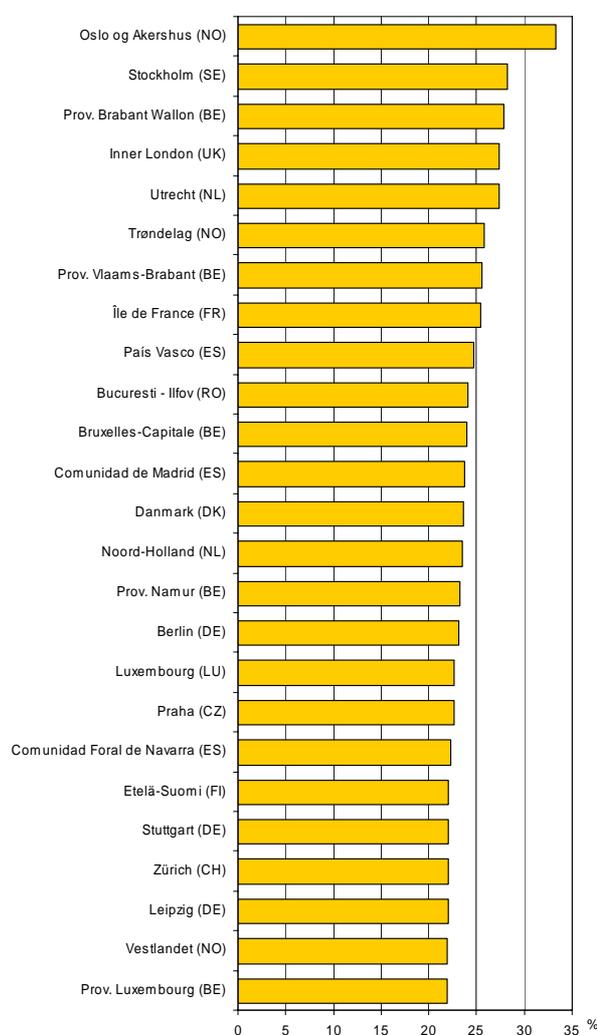
Oslo og Akershus (NO) had the highest share of HRSTC among the labour force

This publication looks at regional data for the EU Member States and for Iceland, Norway, Switzerland and Turkey relating to the core of human resources in science and technology (HRSTC). By definition, HRSTC are persons who have successfully completed tertiary education and work in an S&T occupation as professionals or technicians. Data are shown at NUTS level 1 or 2 depending on availability (see methodological notes on page 7).

Figure 1 shows the 25 regions with the largest shares of HRSTC among the regional labour force in 2006. Oslo og Akershus (NO) was the region with the highest proportion of HRSTC (33%) among the regional labour force. Stockholm (SE), Province Brabant Wallon (BE), Inner London (UK) and Utrecht (NL) followed with shares of between 27% and 28%. Thirteen of the 25 leading regions were capital regions¹. Belgian regions were more strongly represented than others.

¹ For countries where regional data is not available, the whole country is classified as the capital region

Figure 1: 25 regions (NUTS level 2) with the highest shares of HRSTC among the regional labour force (aged 25-64), in the EU and selected countries — 2006



In this publication DK, EE, CY, LV, LT, LU, MT, SI and IS are classified as regions at NUTS level 2. For HRST definitions and NUTS classification see methodological notes on page 7.

Source: Eurostat HRST statistics

Eleven of the 13 Greek regions are to be found in the top 25 regions with the largest shares of HRSTC among the HRST population

Table 2: 25 regions (NUTS level 2) with highest shares of HRSTC among the HRST population, in thousands, in terms of percentages and in annual average growth rate 2001-2006, in the EU and selected countries — 2006

	Regional HRSTC		
	in 1 000s	as a % of regional HRST population	AAGR 2001-2006
Ipeiros (EL)	23	53.5	7.5
Trøndelag (NO)	54	53.5	3.7
Região Autónoma da Madeira (PT)	11	52.4	0.0
Nord-Norge (NO)	51	52.0	0.8
Notio Aigaio (EL)	14	51.9	9.2
Dytiki Makedonia (EL)	17	51.5	4.0
Bucuresti - Ilfov (RO)	258	51.3	10.2
Oslo og Akershus (NO)	191	50.7	2.6
Voreio Aigaio (EL)	11	50.0	9.5
Thessalia (EL)	50	49.0	5.6
Luxembourg (LU)	47	48.5	8.0
Kriti (EL)	38	48.1	7.9
Agder og Rogaland (NO)	74	48.1	2.6
Vestlandet (NO)	92	47.9	1.1
Kentriki Makedonia (EL)	136	47.7	5.1
Centro (P) (PT)	106	47.3	6.9
Stereia Ellada (EL)	26	47.3	7.6
Dytiki Ellada (EL)	42	47.2	10.1
Övre Norrland (SE)	56	46.7	3.6
Danmark (DK)	689	46.6	3.4
Hedmark og Oppland (NO)	34	46.6	1.9
Utrecht (NL)	179	46.5	5.3
Norte (PT)	158	46.5	5.0
Attiki (EL)	357	46.1	5.7
Peloponnisos (EL)	28	45.9	4.0

In this publication DK, EE, CY, LV, LT, LU, MT, SI and IS are classified as regions at NUTS level 2.

Source: Eurostat HRST statistics

The population of human resources in science and technology (HRST) are defined as persons fulfilling at least one of the following criteria:

- Having successfully completed tertiary level education,
- Working in a science and technology occupation.

As mentioned earlier, the core group of HRST (HRSTC) are defined as persons fulfilling both criteria. An interesting indicator is the share of HRSTC among HRST, as high shares could indicate a match between the demand for and supply of highly qualified staff. In the EU as a whole, HRSTC accounted for 37% of the total HRST population in 2006.

There are some regional disparities and Table 2 shows the 25 regions in the EU, Norway, Iceland, Switzerland and Turkey which have the highest proportions of HRSTC among the regional HRST.

Eleven of the 13 Greek regions at NUTS level 2 appear in the top 25 regions. Ipeiros (EL), with 53.5%, was the region with the largest share of HRSTC among the HRST, together with Trøndelag (NO). Six of Norway's seven regions were among the top 25 regions.

Looking at HRSTC annual average growth rates (AAGR) between 2001 and 2006, differences between the top 25 regions are clearly apparent. Bucuresti – Ilfov (RO) scored the highest growth rate with 10.2% followed by Dytiki Ellada (EL) with 10.1%. At the other end of the scale, Região Autónoma da Madeira was the only region among the top 25 that did not increase its stock of HRSTC during the same period. Two Norwegian regions, Nord-Norge (NO) and Vestlandet (NO), also posted low growth rates, with 0.8% and 1.1% respectively.

Women accounted for 72% of Estonian HRSTC

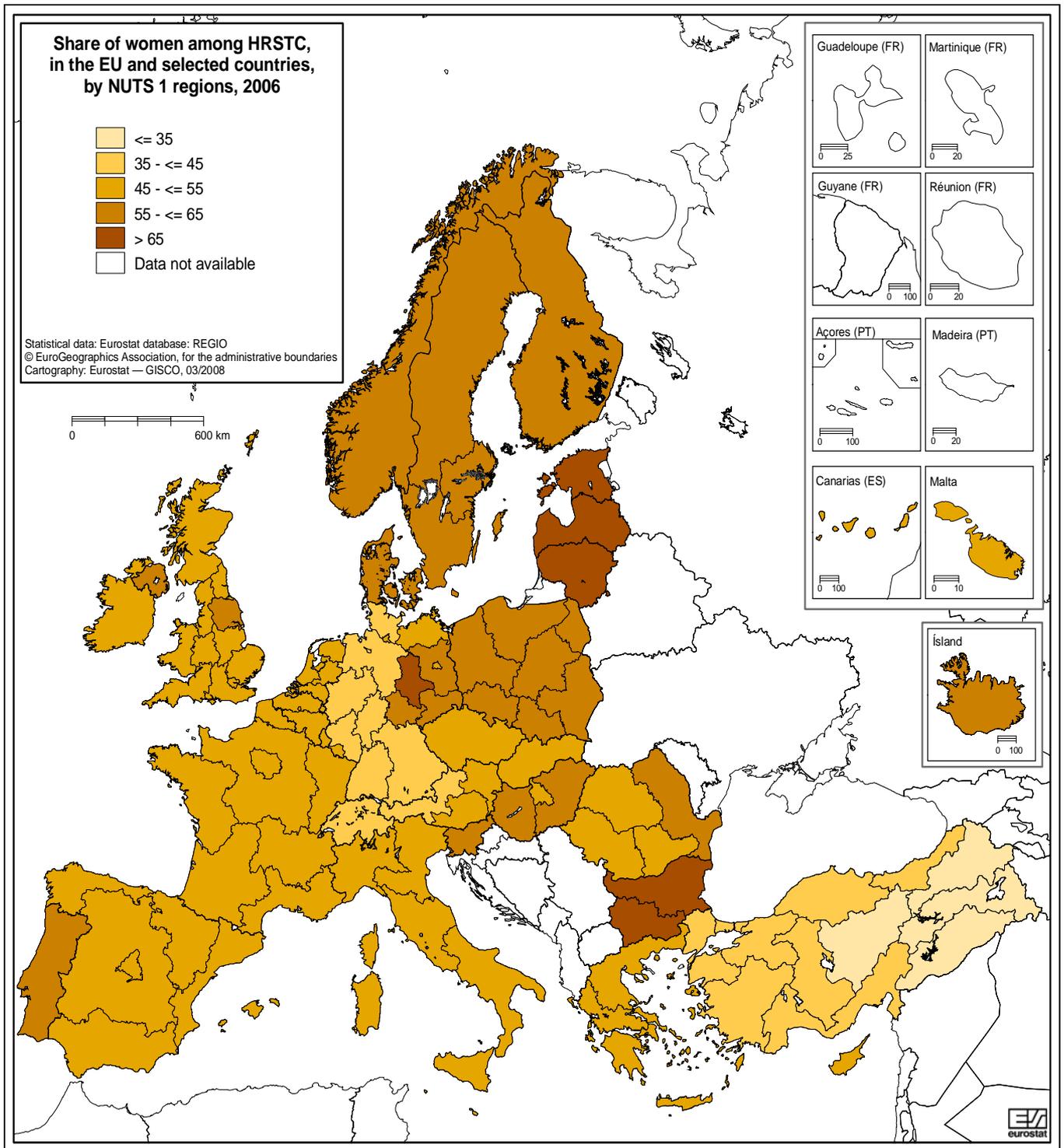
The regional shares of women among the HRSTC are shown in Map 3. In 2006, six regions recorded shares of at least 60% of women among HRSTC. This was the case for all three Baltic countries, of which Estonia had the EU's highest share of women among the HRSTC (72%). The two Bulgarian regions, Severna I Iztochna Bulgaria (BG) and Yugozapadna I Yuzhna Tsentralna Bulgaria (BG), also scored very high shares of over 66%.

At the other end of the scale, female HRSTC were least represented in the Turkish regions. The female shares were around 40% or lower in all Turkish regions. Four Turkish regions even had a proportion of female HRSTC below 35%: Orta Anadolu (TR), Kuzeydogu Anadolu (TR), Ortadogu Anadolu (TR) and Guneydogu Anadolu (TR).

Disparities are observed within countries, too. For example, three German regions, Brandenburg (DE), Sachsen (DE) and Thüringen (DE), showed proportions of female HRSTC above 55%. At the same time, in eight German regions, shares of female HRSTC fell below 45%. Niedersachsen (DE), with 36%, recorded the lowest share of women among HRSTC in Germany.

Finally, in the capital regions, females were well represented among the HRSTC, with shares close to 50%. In Contiente (PT), Centralny (PL) and Manner-Suomi (FI) more than 60% of HRSTC were females.

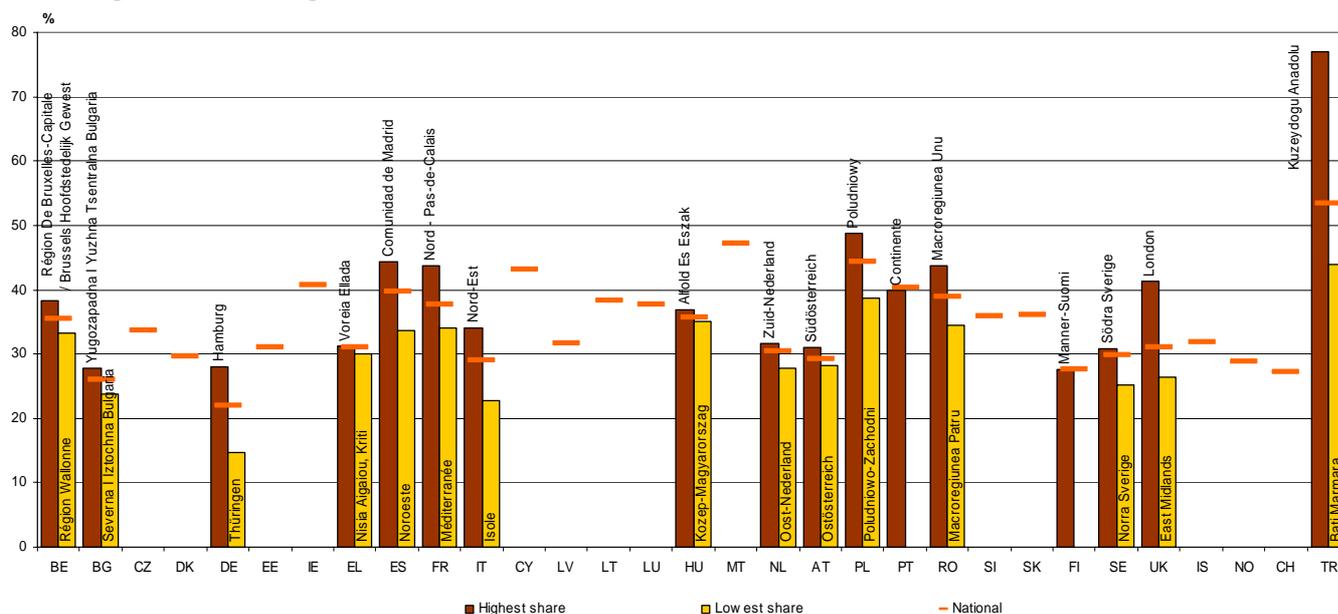
Map 3: Female share of HRSTC (NUTS level 1) in the EU and selected countries — 2006



In this publication CZ, DK, EE, IE, CY, LV, LT, LU, MT, SI, SK, IS, NO and CH are classified as regions at NUTS level 1. Data for following region lack reliability due to small sample size but are still considered publishable: Åland (FI).

Over three quarters of the HRSTC in Kuzeydogu Anadolu (TR) were aged 25-34

Figure 4: Regional range (NUTS level 1) of the share of HRSTC aged 25-34 among the HRSTC aged 25-64, highest/lowest regional and national shares, in the EU and selected countries — 2006



In this publication CZ, DK, EE, IE, CY, LV, LT, LU, MT, SI, SK, IS, NO and CH are classified as regions at NUTS level 1. Only data for one region available at NUTS level 1 for PT and FI due to too small sample size.

Source: Eurostat HRST statistics

Figure 4 illustrates the share of young HRSTC (aged 25-34) among all HRSTC in the 25-64 age group. It gives an idea of the dynamism of the regional HRSTC stock and helps in evaluating the possible future shortage of highly qualified workers in the EU.

The proportion of HRSTC aged 25-34 was not evenly distributed in 2006. The highest national shares of HRSTC aged 25-34 in the EU were found in Malta (47.1%) and Poland (44.3%). Of the countries having regional details at NUTS level 1 the Polish region of Poludniowy (PL) had the highest share in the EU, with nearly half of its HRSTC aged 25-34.

The spread between the regions with the highest and lowest shares respectively of 25-34 year old HRSTC vary widely from one country to another. Of the EU Member States, the United Kingdom showed the largest disparity between its highest and lowest regional shares. In London (UK) the share of HRSTC aged 25-34 was 41.4%, while in East Midlands (UK) it was only 26.3%. In Germany, also, there was a relatively large gap between the top and bottom regions. Hamburg (DE) had the highest share (28.0%), while Thüringen (DE) had the lowest (14.7%).

Conversely, in other countries there is less of a spread between the leading region and the bottom region. In six of the 14 EU Member States that have regional data at NUTS level 1 for this breakdown, the gap between the highest and lowest share did not exceed five percentage points. For

example, in Greece, Voreia Ellada (EL) presented the highest share with 31.3%, while Nisia Aigaiou, Kriti (EL) was lowest, with 30.0% of HRSTC aged 25-34.

The regions of the EU candidate country, Turkey, had very large shares of HRSTC aged 25-34 within the 25-64 HRSTC age group. In Kuzeydogu Anadolu (TR) more than three quarters of the HRSTC were aged 25-34. At the same time, the smallest share in Turkey was in the region of Bati Marmara (TR) where 43.9% of the HRSTC were aged 25-34, which is still comparable to the highest regional shares in the EU countries.

One of the Eurobarometer surveys investigated EU citizens' attitudes to the Union's Regional Policy. It reveals that Europeans generally approve of the policy.

Specific questions were asked to find out the policy areas where EU citizens would prefer to see their city or region being supported by the EU. The top priority was given to *educational, health and social issues* (90%). In addition, around eight out of ten respondents considered *employment training and support for small businesses* to be among the more important policy areas. Some 69% of respondents would like to see their city or region supported in their efforts to foster *research and innovation*, while one quarter of respondents considered EU support in this area to be less important (26%).

Source: Citizens' perceptions of EU Regional Policy, Flash Eurobarometer Series #234, The Gallup Organization, February 2008, http://ec.europa.eu/public_opinion

In Nisia Aigaiou, Kriti (EL), five out of six employees in the education sector were HRSTC

Human resources in science and technology are often strongly represented in certain sectors of economic activities, such as ‘*public administration, extra-territorial organizations and bodies*’ and ‘*education*’ sectors. Table 5 shows the 25 regions with the highest shares of HRSTC among persons employed in each of these two sectors and in all sectors in 2006.

Looking first at all sectors, the leading region in 2006 was Région de Bruxelles-Capitale/Brussels Hoofdstedelijk Gewest (BE) with 29.1%. Berlin (DE) and Île de France (FR) followed with shares of 28.3%. In fact, the top eight regions were all capital regions. German regions were the most represented, with six out of the 25 top regions.

In the ‘*public administration, extra-territorial organizations and bodies*’, Hamburg (DE) is top with 43.6% of employees being HRSTC. Again, Germany is well represented with five regions. Poland, to, has five of its six regions in the top ranking, while all three of Sweden's regions are among the leading regions. In addition, 12 of the 25 leading regions are capital regions.

These shares of HRSTC were around twice as high in the ‘*education*’ sector compared to the ‘*public administration, extra-territorial organizations and bodies*’ sector. Nisia Aigaiou, Kriti (EL) and

Voreia Ellada (EL) are in the lead with shares of employed HRSTC exceeding 82%. In fact, all four Greek regions are among the top eight regions. The other four regions among the top eight are Spanish; moreover, six of the seven Spanish regions are among the leading 25 regions.

One reason that could explain the high regional shares of HRSTC in the ‘*education*’ sector is that some countries might place emphasis on having a large share of their teaching staff highly educated. By requiring a high minimum level of qualification, countries encourage future teachers to obtain university degrees. However, shares are also dependent on the kind of staff included in the specific sectors of a country. If, for example, in one country staff working in school canteens are counted in the education sector, the shares will be lower than for a country where school meals are mainly out-sourced.

Finally, even though capital regions in general contain large concentrations of HRSTC, the same does not appear to be true in the ‘*education*’ sector. Of the 20 regions with the highest shares of HRSTC, only three are capital regions. For some countries, at least, such as Greece and Spain, the education sector seems depend more on the national labour structure than on regional diversity.

Table 5: 25 regions (NUTS level 1) with the highest shares of employed HRSTC among the employment by selected sectors of economic activity, in the EU and selected countries — 2006

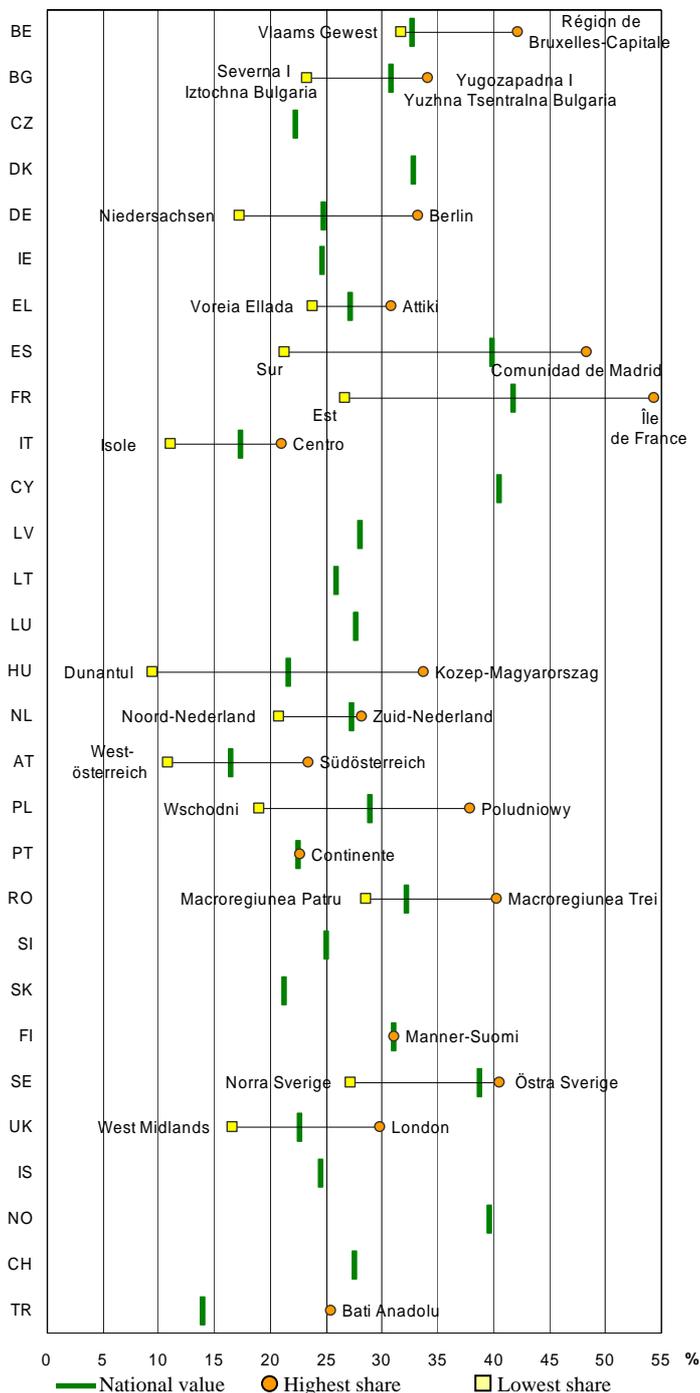
All sectors		Public administration, extra-territorial organizations and bodies		Education	
Région De Bruxelles-Capitale/Brussels Hoofdstedelijk Gewest (BE)	29.1	Hamburg (DE)	43.6	Nisia Aigaiou, Kriti (EL)	82.9
Berlin (DE)	28.3	Berlin (DE)	42.6	Voreia Ellada (EL)	82.5
Île De France (FR)	28.3	Östra Sverige (SE)	40.8	Noreste (ES)	81.3
Östra Sverige (SE)	26.9	Slovenija (SI)	40.4	Noroeste (ES)	80.6
London (UK)	25.4	Norge (NO)	38.6	Sur (ES)	80.2
Comunidad De Madrid (ES)	25.3	Centralny (PL)	37.8	Centro (ES)	79.9
Danmark (DK)	24.6	Södra Sverige (SE)	37.6	Attiki (EL)	79.8
Luxembourg (Grand-Duché) (LU)	23.9	Lietuva (LT)	36.6	Kentriki Ellada (EL)	79.5
Région Wallonne (BE)	23.6	Poludniowy (PL)	36.3	Dogu Karadeniz (TR)	78.1
West-Nederland (NL)	23.6	Norra Sverige (SE)	36.3	Brandenburg (DE)	77.6
Noreste (ES)	23.3	Thüringen (DE)	35.4	Este (ES)	77.5
Sachsen (DE)	23.2	Manner-Suomi (FI)	35.0	Guneydogu Anadolu (TR)	77.3
Manner-Suomi (FI)	22.8	Eesti (EE)	34.7	Kypros / Kibris (CY)	76.9
Vlaams Gewest (BE)	22.0	Poludniowo-Zachodni (PL)	33.3	Thüringen (DE)	74.1
Kozep-Magyarország (HU)	22.0	Noord-Nederland (NL)	33.2	Ege (TR)	73.9
Södra Sverige (SE)	21.7	West-Nederland (NL)	33.1	Vlaams Gewest (BE)	73.7
Attiki (EL)	21.5	Noreste (ES)	32.6	Noord-Nederland (NL)	72.9
Thüringen (DE)	21.2	Danmark (DK)	32.0	Akdeniz (TR)	72.0
Norra Sverige	20.4	Wschodni (PL)	31.4	West-Nederland (NL)	71.5
Kypros / Kibris (CY)	19.9	Sachsen (DE)	31.1	Oost-Nederland (NL)	71.0
Hamburg (DE)	19.8	Yugozapadna I Yuzhna Tsentralna Bulgaria (BG)	31.0	Luxembourg (Grand-Duché) (LU)	70.9
Noord-Nederland (NL)	19.7	Baden-Württemberg (DE)	30.9	Comunidad De Madrid (ES)	70.8
Centralny (PL)	19.7	Polnocno-Zachodni (PL)	30.4	Bati Anadolu (TR)	70.2
Brandenburg (DE)	19.6	Kozep-Magyarország (HU)	29.7	Norge (NO)	70.0
Bremen (DE)	19.6	Luxembourg (Grand-Duché) (LU)	29.7	Kuzeydogu Anadolu (TR)	69.8

In this publication CZ, DK, EE, IE, CY, LV, LT, LU, MT, SI, SK, IS, NO and CH are classified as regions at NUTS level 1.

Source: Eurostat HRST statistics

54% of the employees in the high-tech sectors in Île de France (FR) were HRSTC

Figure 6: Regional range (NUTS level 1) of HRSTC employed in high-tech sectors, as percentage of employment, in the EU and selected countries — 2006



The high-tech sectors combine ‘*high-tech manufacturing*’ (includes for example *manufactures of office machinery and computers*) and ‘*knowledge-intensive high-technology services*’ (includes for example *computer and related activities* and *research and development*). Apart from having a notable level of R&D intensity, high-tech sectors are also generally assumed to have a large proportion of highly educated people. In the EU, 28% of the employees in the high-tech sectors were HRSTC in 2006.

Figure 6 shows the proportion of employees in high-tech sectors that are HRSTC by comparing the regional in-country disparities between the EU Member States and a number of selected countries. The national values are also shown. In 2006, the national shares of HRSTC employed in high-tech sectors ranged from 14% in Turkey to 42% in France, with Cyprus (40%) and Spain (40%) following close behind. The regions with the highest proportion of HRSTC employed in high-tech sectors were often found in capital regions. Figure 6 shows this to be true for 11 of the 14 EU Member States where data for this breakdown were available for at least two regions.

Comparing the leading region of the countries with each other, Île de France (FR), with 54%, had the largest share followed by Comunidad de Madrid (ES) with 49%. At the other end of the scale, Centro (IT) had a share of only 21%. Conversely, Dunantul (HU) was the region with the smallest regional proportion of HRSTC employed in high-tech with 9%, followed by Isole (IT) and Westösterreich (AT) with 11% each.

There are considerable regional variations in dispersions between the leading region and the bottom region from one country to another. France showed the biggest difference between its top and bottom regions, as more than half of the workers in high-tech were HRSTC in Île de France (FR), while Est (FR) had 27%. Spain and Hungary also showed large disparities. In other Member States the dispersion between the leading region and the bottom region was relatively small. Greece and the Netherlands showed the smallest gap (seven percentage points) between their highest and lowest regional shares of HRSTC employed in high-tech. To summarise, highly qualified workers occupied in science and technology are well represented in capital regions in general. However, the ‘*education*’ sector, with very high shares of HRSTC, does not follow this trend. Female HRSTC are well represented in many eastern regions of the EU, while Turkey has very high regional shares of young HRSTC.

For information about high-tech sectors see methodological notes on page 7. In this publication CZ, DK, EE, IE, CY, LV, LT, LU, MT, SI, SK, IS, NO and CH are classified as regions at NUTS level 1. No data available for EE and MT and only data for one region available for PT, FI and TR due to too small sample size. Data for following regions lack reliability due to reduced sample size but are considered publishable: Severna I Iztochna Bulgaria (BG), Voreia Ellada (EL), Isole (IT), Noord-Nederland (NL), Südösterreich (AT), Westösterreich (AT), Wschodni (PL), Macroregiunea Patru (RO) and Lithuania (LT).

Source: Eurostat HRST statistics

ESSENTIAL INFORMATION – METHODOLOGICAL NOTES

1. Human resources in science and technology

Human Resources in Science and Technology (HRST) can be divided into different sub-populations using characteristics of educational achievement and occupation following the guidelines of the OECD *Canberra Manual* (see figure below).

This Statistics in Focus publication shows results for the following specific HRST category:

Core of Human Resources in Science and Technology — HRSTC

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 or technicians (ISCO '88, COM codes 2 or 3).

Reference manual

Manual on the measurement of human resources devoted to S&T — Canberra Manual, OECD, 1994.

2. Data sources

The indicators presented are derived from the **European Union Labour Force Survey (EU LFS)** and compiled in November 2007. A break in series for all the HRST stocks exists for all countries except BE and LU in 2006. This is due to a change in the methodology of the LFS data collection modifying the periodicity of certain 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 where data lack reliability due to reduced sample size are flagged.

3. 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 European Union. 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 whole number of NUTS 2 regions, and so on.

In this publication, data for the EU Member States, Iceland, Norway, Switzerland and Turkey are presented at NUTS 1 or NUTS 2 level. Thus the regional rankings only consider regions of these countries.

In addition the following countries are classified as regions at NUTS level 2 in this publication; Cyprus, Denmark, Estonia, Latvia, Lithuania, Luxembourg, Malta, Slovenia and Iceland and at NUTS level 1 also the Czech Republic, Ireland, Slovakia, Norway and Switzerland.

More information can be found on:

<http://europa.eu.int/comm/eurostat/ramon/nuts>

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:

- **Public administration, extra-territorial organization and bodies** (codes: 75 and 99)
- **Education** (code: 80)
- **High-tech sectors:** This aggregate combines:
 - high-tech manufacturing (codes: 30 Manufacture of office machinery and computers, 32 Manufacture of radio, television and communication equipment and apparatus, 33 Manufacture of medical, precision and optical instruments, watches and clocks)
 - knowledge-intensive high-technology services (64 Post and telecommunications, 72 Computer and related activities, 73 Research and development)

(Two-digit codes refer to NACE divisions)

5. Statistical abbreviations and Symbols

- u Lack reliability due to reduced sample size
- : Not available

		HRSTE — HRST in terms of Education —			
		Tertiary education			Lower than tertiary education
		ISCED 6	ISCED 5a	ISCED 5b	ISCED < 5
HRSTO — HRST in terms of Occupation —	ISCO 2	HRST Core — HRSTC			HRST without tertiary education
	ISCO 3				
	ISCO 1	HRST non-core			Non-HRST employed
	ISCO 0, 4-9				
		HRST unemployed — HRSTU			Non-HRST unemployed — NHRSTU
		HRST inactive			Non-HRST inactive
		Unemployed			
		Inactive			

Further information

Data: [Eurostat Website: http://ec.europa.eu/eurostat](http://ec.europa.eu/eurostat)

Science and technology

Human Resources in Science & Technology

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