Statistics in focus

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Employees with third level education but not working in an S&T occupation

Who are they and what are they doing?

Human resources in science and technology (HRST) are people who have successfully completed tertiary education or are working in an S&T occupation. Of the HRST a large share are not working in an S&T occupation. This gives interesting insights into the balance between demand and supply on the EU labour market.

Nearly one quarter of the employed HRST in the EU are not working in an S&T occupation. In Estonia this proportion is 40%, while the growth has been strongest in Portugal. Young people, aged 25-34 years, are overrepresented and women are underrepresented in most of the EU Member States. 72% work in the services sector.

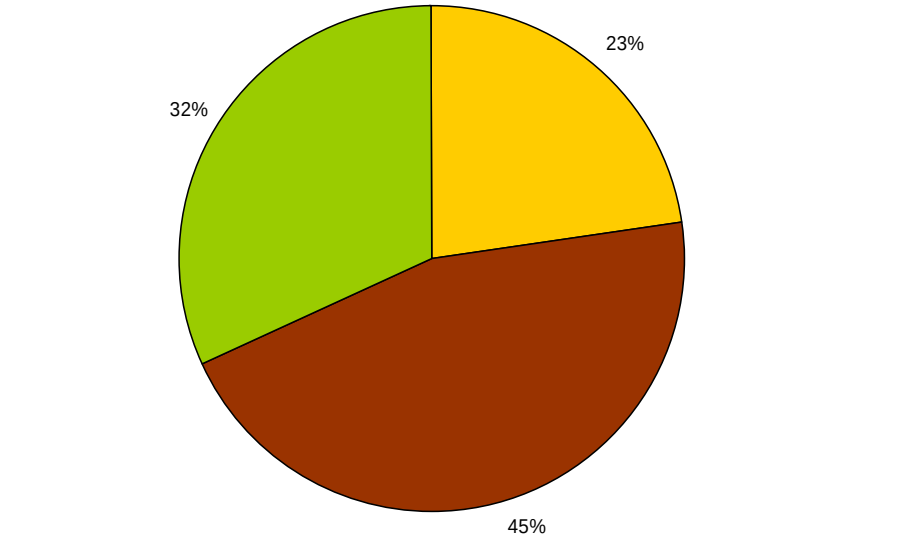
One quarter of the employed HRST in the EU have third level education but are not working in an S&T occupation

Matching education and employment has always been a challenge. People are educated in certain domains and expect jobs corresponding to their qualifications, yet, conversely, especially in fast changing economies, the jobs available on the labour market do not systematically match people's qualifications.

Tertiary education aims at preparing people for qualified occupations. These qualified occupations can be measured by whether they are S&T occupations (mainly professionals and technicians) or not (see methodological notes).

Levels of education and occupations thus give the three categories of employed human resources in science and technology (employed HRST) shown in Figure 1. At EU level 23% of the employed HRST have third level education but do not work in S&T while 45% have third level education and do work in S&T. The remaining 32% of the employed HRST work in S&T but without third level education.

Figure 1: Employed HRST, 25-64 years, by category in the EU, 2006



Source: Eurostat HRST database

In Estonia 40% of the employed HRST have third level education but are not working in an S&T occupation

Human resources in science and technology (HRST) are people who have successfully completed tertiary education or are working in an S&T occupation. Even though the official definition of HRST contains the term “S&T”, all fields of study in tertiary education are covered. "S&T occupation" refers to people occupied as *professionals* and *technicians and associate professionals*, so only these occupations are counted as “working in an S&T occupation”.

Consequently, *management posts* are excluded and counted, along with other non-S&T occupations, in the group “not working in an S&T occupation” (see methodological notes). Therefore the national figures depend on the national labour structure. In other words, countries where hierarchical organisations are more common might therefore have higher shares.

However, a high share of employed HRST with a third level education but not working in an S&T occupation (HRST non-core) might also indicate that better matching is needed between sectors of activity demanding specific advanced qualifications and the pool of HRST available on the labour market. It could be that the supply of HRST does not match the exact profiles demanded by S&T companies.

In 2006 the share of HRST non-core varied widely from 9% in Luxembourg to 40% in Estonia. Close behind Estonia, Ireland and Spain also showed high shares.

Access to an S&T occupation without a tertiary qualification seems easier in the Czech Republic, Italy, Malta, Slovakia, Iceland and Austria. These are the only countries where the proportion of employed HRST working in an S&T occupation without tertiary education is higher than the share with tertiary education.

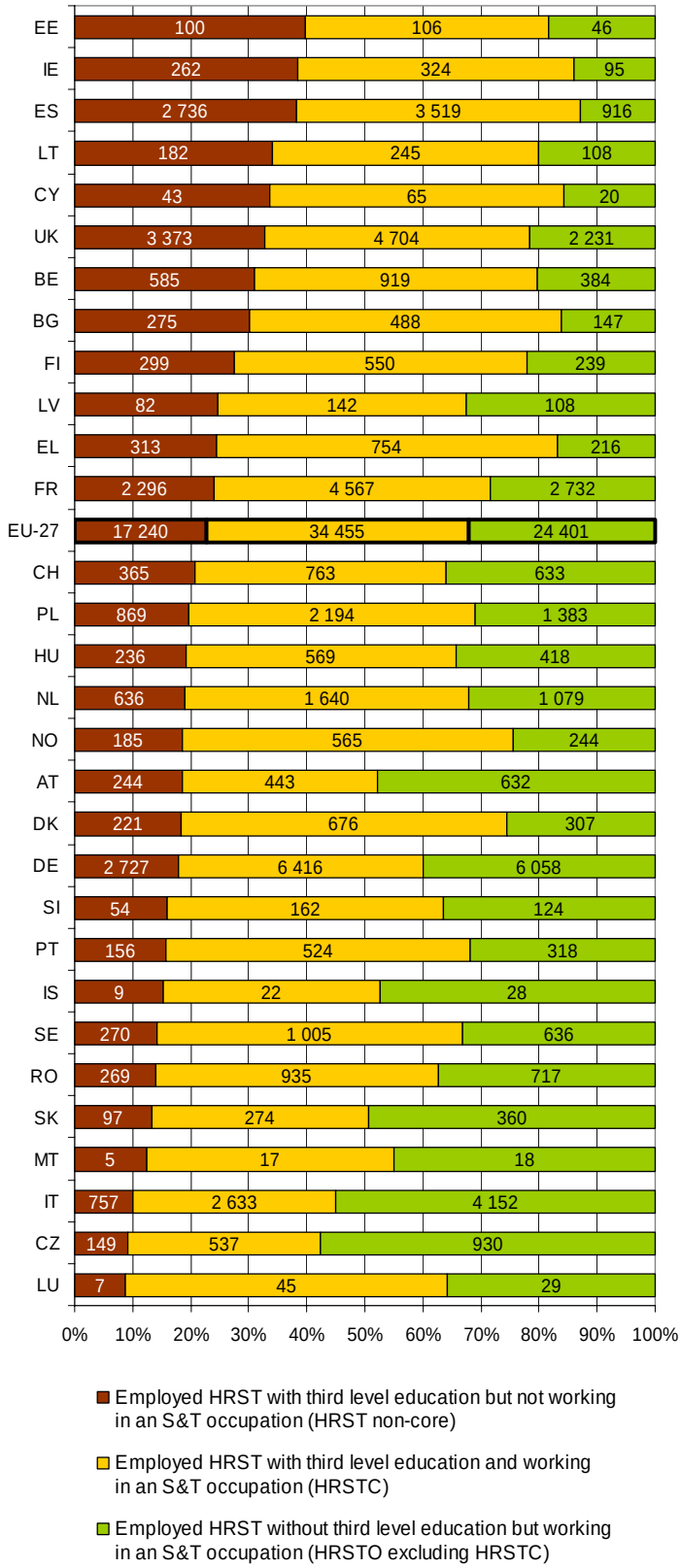
Demand and supply in science, engineering and technology (SET)

Regarding **demand** “Businesses can no longer do it alone; they have to rely on new players in the technology stakes, whether this means exploiting their supply chain, venture funds, academia or inorganic acquisition via start-up companies.”

“From a **supply** perspective (…) there is a need for a step change in recruitment into SET at all levels. Dramatically increasing the number of women entering SET careers would go a long way towards helping to solve the problem, whereas reliance on importing suitably qualified workers from outside the EU is not sustainable in the long term, given the global nature of the market and the dynamics at play.”

Source: *“Increasing human resources for science and technology in Europe”, Report of the High-Level Group on Human Resources for Science and Technology in Europe – 2004*, European Commission.

Figure 2: Employed HRST, aged 25-64, by category, in proportions and in thousands, in the EU and selected countries, 2006



Source: Eurostat HRST database

25-34 year olds are overrepresented among employed HRST non-core

Which age groups make up the employed HRST with third level education but not working in an S&T occupation (HRST non-core)? Careers for those recently graduated might start in occupations not directly related to their education. After having gathered work experience, professional occupations are more accessible and at the end of a career many senior employees move from professional roles to management roles. Thus the HRST non-core are likely to consist of mainly young persons at the beginning of their careers and senior officials occupied as managers.

The target age group when considering employed HRST is 25-64 years. In Figure 3 this is split into the age groups 25-34, 35-44 and 45-64 years.

As shown in Figure 3, some 34% of the HRST non-core in the EU were aged between 25 and 34 years. In fact among the employed HRST non-core the 25-34 age group was larger than 25% in every country apart from Latvia, Denmark, the Czech Republic, Switzerland, Iceland, Austria, Finland, Germany and Luxembourg.

The share of 25-34 year olds is over 40% in five countries: Ireland, Poland, Portugal, France and Spain. The highest share of 25-34 year olds was found in Ireland with 48%.

Comparison of these five countries' positions in Figure 2 shows that they are all spread out. In other words, there does not seem to be any link between a large national share of employed HRST non-core and a large national share of young persons among the employed HRST non-core.

Finally, among the big economies, Germany stands out with one of the lowest percentages of young HRST non-core. Only 19% of the employed HRST with third level education but not working in an S&T occupation were between 25 and 34 years old in Germany. One reason for this is the ageing workforce in Germany, but it could also be an indication that young persons with tertiary education are being absorbed well into science and technology occupations.

Employment in S&T: where are the older people?
A glance at Quebec (Canada) data.

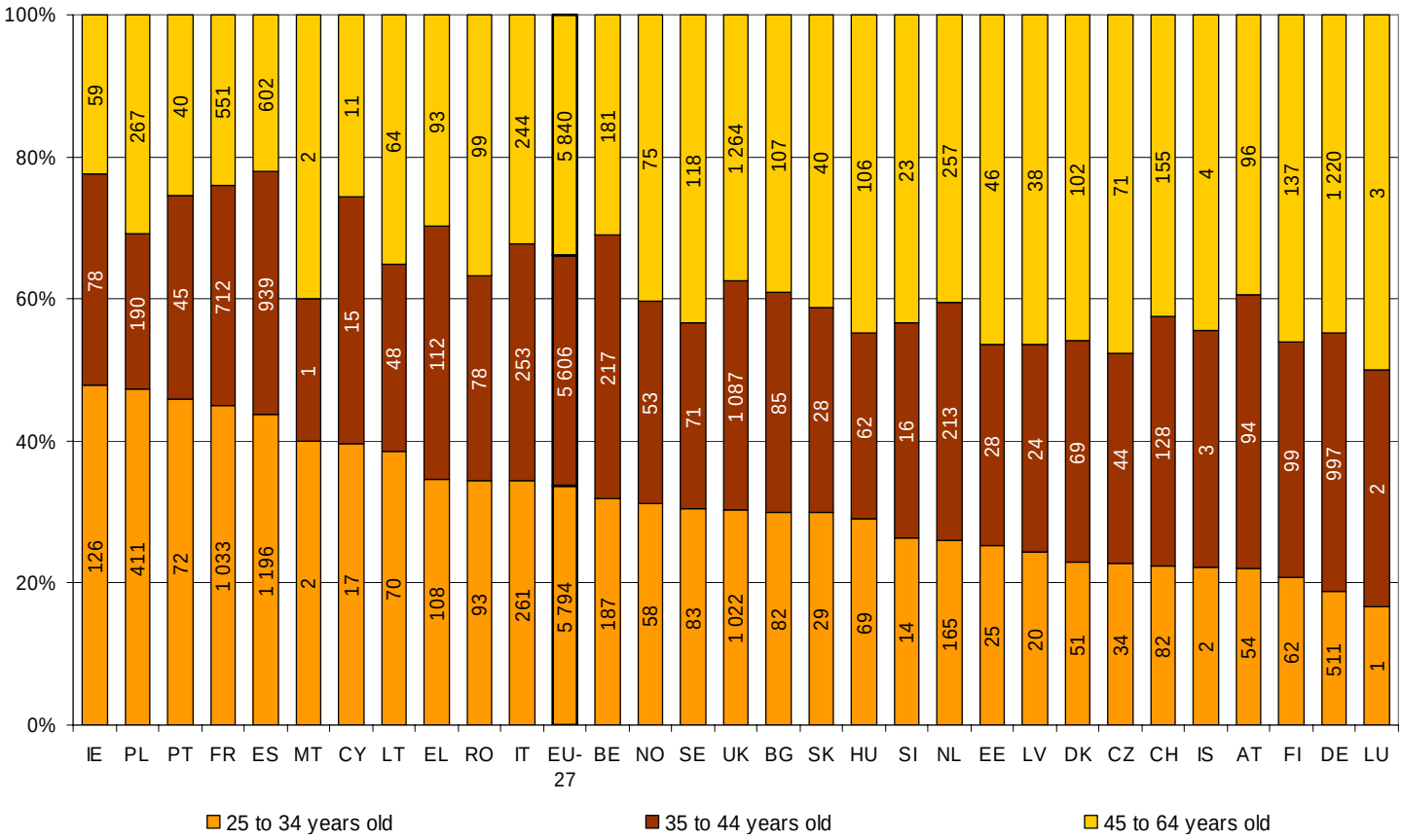
"In 2005 (…) more than one person out of two employed in S&T with an occupation in public administrations or public services was aged 45 years or more."

"Most older human resources in S&T work in real estate, renting and business activities: 64.9% of human resources in S&T by occupation are 45 or above."

"More than half of the labour force in S&T in the 45–64 age group work in health and social work, education, public administration and public services."

Source: *S@voir.stat, Bulletin de l'économie du savoir*, June 2006, Institut de la statistique du Québec.

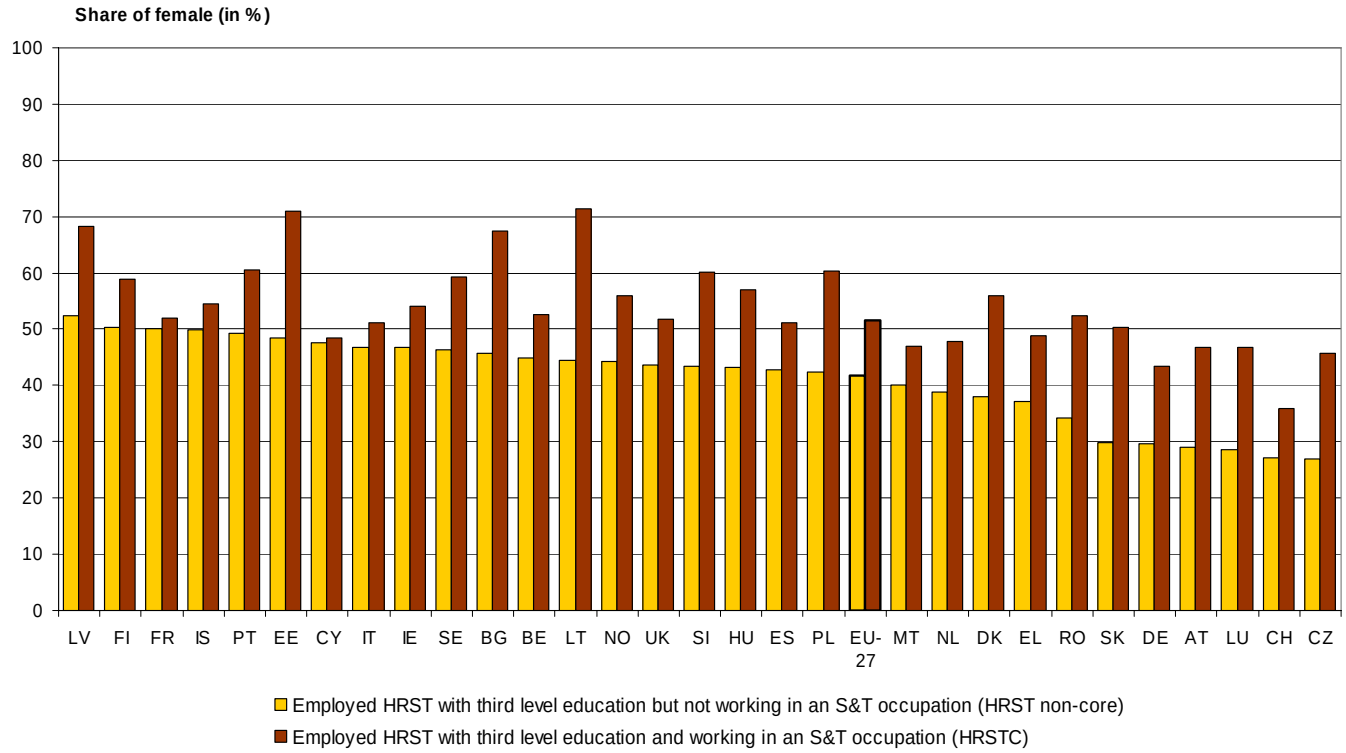
Figure 3: Employed HRST with third level education but not working in an S&T occupation, by age group, in proportions and in thousands, in the EU and selected countries, 2006



Source: Eurostat HRST database

The share of women among HRST non-core is below 50% in most Member States

Figure 4: Share of female employed HRST with third level education, whether working in an S&T occupation or not, aged 25-64, in the EU and selected countries, 2006



Source: Eurostat HRST database

The gender issue is at the top of the S&T policy agenda for the European Commission. It is a key to meeting the target set by the Lisbon summit in March 2000 of making Europe the most competitive and dynamic knowledge-based economy in the world.

Increasing human resources in S&T to fill the current gap is one of the recommendations made by the High-Level Group on Human Resources for Science and Technology appointed by the European Commission in 2003 (see text box for full references). One acknowledged finding is that women "leak out" of S&T in Europe and that strong action must be taken to change that.

Figure 4 shows the national shares of females among employed HRST with third level education but not working in an S&T occupation (HRST non-core) compared with the national shares for employed HRST with third level education who are working in an S&T occupation (HRSTC).

Firstly, when looking specifically at the employed HRST non-core, the female shares vary from 27% (the Czech Republic) to 52% (Latvia). For most countries the share is between 40% and 50%, but for Slovakia, Germany, Austria, Luxembourg, Switzerland and the Czech Republic, the female share is below 30%.

Secondly, the share of women among HRST non-core is lower than among HRSTC in all countries. In addition, only in a few countries (Cyprus, France and Italy) is the share of women among the employed human resources with a tertiary education similar whether working in an S&T occupation or not.

But in most countries there is a marked difference in the female share, between the HRST non-core and the HRSTC, especially in many new Member States (2004 and 2007 enlargements). In the Baltic countries (Estonia, Latvia and Lithuania) and in Bulgaria the proportion of women in HRSTC is also over 65%.

Women in science – filling the gender gaps in science and research

"Women are the most obvious source for increasing the numbers of highly trained scientists, engineers and technologists, because this talent pool already exists and can be expanded" (Rübsamen-Waigmann et al., 2003).

Source: *"Increasing human resources for science and technology in Europe", Report of the High-Level Group on Human Resources for Science and Technology in Europe – 2004*, European Commission.

17% of the HRST non-core are employed in the manufacturing sector

Services is the predominant sector in the EU employing two thirds (66%) of the total labour force in 2006[1]. Next to the service sector manufacturing also accounts for a large share of the EU labour force with 19%. The manufacturing sector is often seen as a wealth-producing sector closely linked to science and technology. It is therefore interesting to see how many of the tertiary educated persons are employed in manufacturing and if there is a difference depending on whether or not they are working in an S&T occupation.

Looking at the EU's human resources with third level education but not working in an S&T occupation (HRST non-core) the share in manufacturing is similar to the one for the total labour force at 17% (see table 5).

When comparing with the human resources with third level education that do work in an S&T occupation (HRSTC), there is a significantly lower share in manufacturing at 10%. In other words, HRST non-core are more likely to work in the manufacturing sector than HRSTC.

25% of the HRST non-core in Austria were employed in the manufacturing sector which was the highest share in the EU. At the same time only 11% of the Austrian HRSTC were employed in manufacturing. In five more countries the share of HRST non-core working in the manufacturing sector was more than double the size of the share of HRSTC working in the same sector. These countries were Bulgaria, Estonia, Greece, Spain and Sweden.

Cyprus had the lowest share of HRST non-core in manufacturing and was also the only country where the share of the HRST non-core working in manufacturing was the same as for the HRSTC.

Finally, a total of 88% of the HRST non-core and 96% of the HRSTC were employed in either manufacturing or services, compared to 75% of the EU's total labour force.

[1] *Source: Eurostat Labour market statistics*

Table 5: Employed HRST with third level education, aged 25-64, by sector of economic activity and whether working in an S&T occupation or not, in thousands and as a percentage of all sectors, in the EU and selected countries, 2006

	Manufacturing				Services			
	HRST non-core		HRSTC		HRST non-core		HRSTC	
	in thousands	as a % of total HRST non-core	in thousands	as a % of total HRSTC	in thousands	as a % of total HRST non-core	in thousands	as a % of total HRSTC
	x 1000	*%*	*x 1000*	*%*	*x 1000*	*%*	*x 1000*	*%*
EU-27	2 896	17	3 550	10	12 351	72	29 497	86
BE	93	16	85	9	457	78	809	88
BG	49	18	37	8	199	72	431	88
CZ	33	22	70	13	99	66	422	79
DK	35	16	66	10	163	74	591	87
DE	653	24	1 012	16	1 617	59	5 120	80
EE	20	20	9 u	8 u	64	64	92	87
IE	37	14	30	9	195	74	279	86
EL	35	11	39	5	254	81	702	93
ES	510	19	330	9	1 870	68	3 026	86
FR	306	13	512	11	1 793	78	3 938	86
IT	109	14	210	8	600	79	2 374	90
CY	2	5	3	5	38	88	59	91
LV	9	11	9	6	58	71	125	88
LT	26	14	19 u	8 u	127	70	216	88
LU	:	:	2	4	6	86	43	96
HU	36	15	43	8	173	73	502	88
MT	:	:	:	:	5	:	15	88
NL	87	14	107	7	463	73	1 433	87
AT	61	25	50	11	135	55	377	85
PL	135	16	207	9	594	68	1 862	85
PT	18	12	32	6	126	81	474	90
RO	40	15	123	13	195	72	703	75
SI	9	17	22	14	39	72	133	82
SK	15	15	29	11	69	71	227	83
FI	54	18	73	13	215	72	451	82
SE	35	13	64	6	216	80	919	91
UK	489	14	365	8	2 584	77	4 173	89
IS	2	22	:	:	7	78	21	95
NO	21	11	29	5	145	78	514	91
CH	65	18	86	11	246	67	655	86

u: lacks reliability due to reduced sample size.

Source: Eurostat HRST database

Trends in HRST non-core

Over the last five years the number of employed HRST with third level education but not working in an S&T occupation (HRST non-core) increased at an annual average growth rate of around 5% at EU level.

Figure 6 compares the annual average growth rate in employed HRST non-core with their share of total employment. In Estonia and Belgium, for instance, and other countries in the lower right area this category of HRST accounted for a by no means negligible share of total employment, combined with a moderate growth rate. Higher growth rates are found in the upper right cluster with Spain an Ireland.

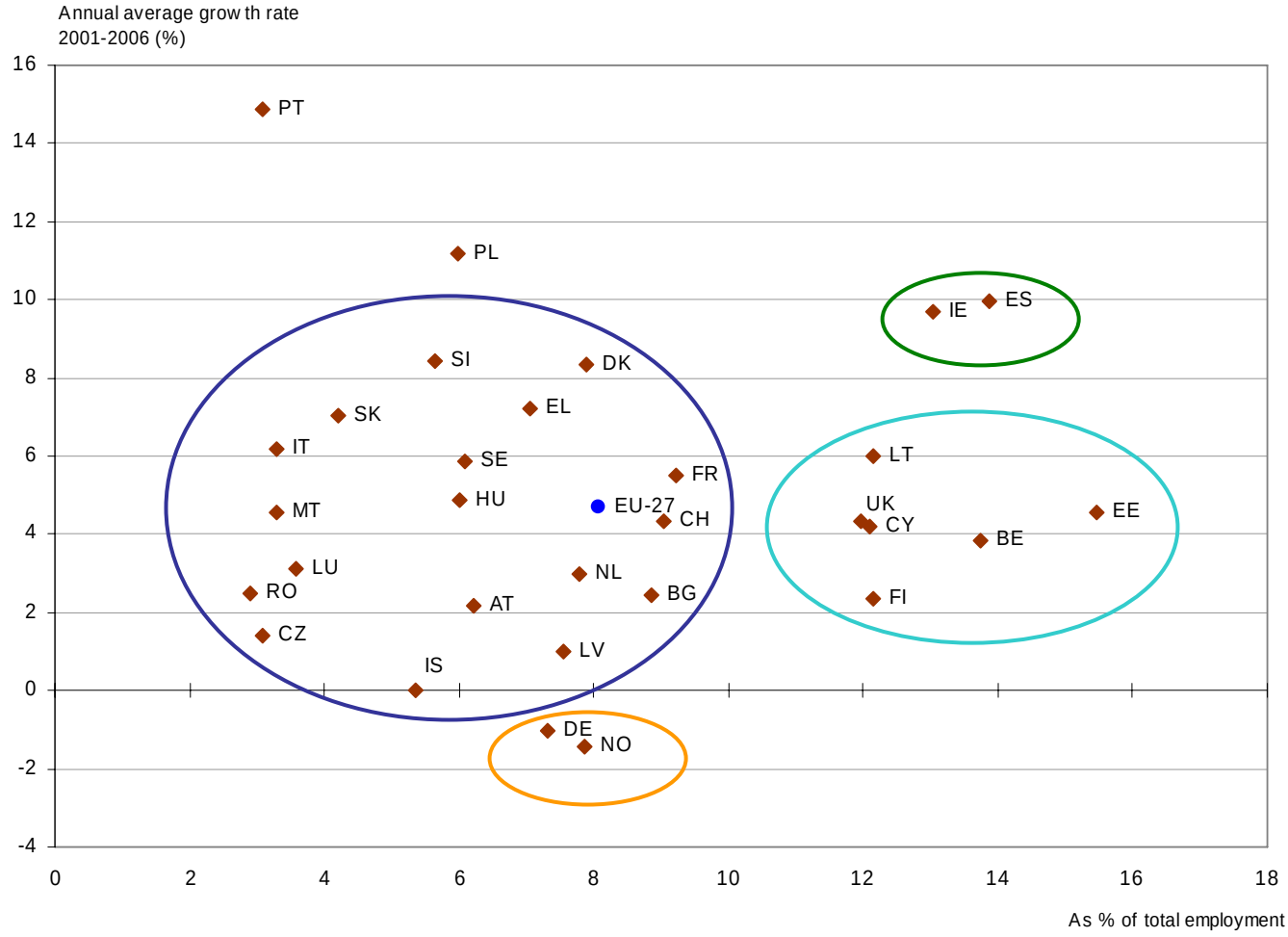
Two countries – Germany and Norway – stand out with a negative growth rate over the five-year period, combined with a share of total employment close to the EU average.

In sharp contrast to these two countries, in Portugal employed HRST not working in an S&T occupation took a low percentage of total employment, but their share increased very considerably, as shown by the annual average growth rate.

Finally, even though most countries recorded an annual average growth rate in employed HRST with third level education but not working in an S&T occupation of between 2% and 8%, the results are quite scattered.

By way of conclusion, this publication shows that in the EU quite a large group of highly educated people are not working in S&T occupations. This is interesting as, at the same time, concerns are being voiced that the supply is not matching the demand. Could it be that European education systems are finding it hard to keep up with the fast-changing world of today or that this large group simply reflects a flexible European labour market? Whatever lies behind these figures, conclusions can only be speculative until analysed in the context of the specific structure and legislation of the countries' labour markets in combination with their education systems.

Figure 6: Annual average growth rate in employed HRST with third level education but not working in an S&T occupation, 2001-2006, and proportion of total employment, aged 25-64, in the EU and selected countries, 2006



Break in series 2006 for all countries with the exception of BE and LU.

Source: Eurostat HRST database

➢ ESSENTIAL INFORMATION – METHODOLOGICAL NOTES

1. Human resources in science and technology

Human resources in science and technology (HRST) can be divided into different sub-groups based on educational achievement and occupation following the guidelines in the *Manual on the measurement of human resources devoted to S&T — Canberra Manual, OECD, 1994:*

- **HRST: Human Resources in Science and Technology**
  - People who have successfully completed education at the third level (ISCED '97 version levels 5a, 5b or 6); **or**
  - are not formally qualified as described above but are employed in an S&T occupation where the above-mentioned qualifications are normally required (ISCO '88 COM codes 2 or 3).
- **HRSTC: Human Resources in Science and Technology — Core**

People who have successfully completed education at the third level (ISCED '97 version levels 5a, 5b or 6) and are employed in an S&T occupation (ISCO '88 COM codes 2 or 3).

- **HRST non-core: Human Resources in Science and Technology — Non-core**

People that have successfully completed education at the third level (ISCED '97 version levels 5a, 5b or 6) and are employed but not in an S&T occupation (ISCO '88 COM codes 2 or 3).

- **HRSTO: Human Resources in Science and Technology — Occupation**

People who are employed in an S&T occupation (ISCO '88 COM codes 2 or 3).

- **HRSTE: Human Resources in Science and Technology —Education**

People who have successfully completed education at the third level in an S&T field of study (ISCED '97 version, levels 5a, 5b or 6).

2. Data sources and quality of the data

HRST stocks are derived from the **European Union Labour Force Survey** (EU LFS). The most recent data were extracted in March 2008[1]. The guidelines on the sample size reliability of the data, established by the EU LFS, are applied to the HRST database. Therefore, breakdowns for which quality levels are considered insufficient are flagged either as unavailable or as lacking reliability due to reduced sample size.

3. ISCO

The classification of occupations is based on the *International Standard Classification of Occupations — ISCO '88.* S&T occupations are defined as occupations under one of the following two codes:

- **Professionals (code 2)**

Occupations whose main tasks require a high level of professional knowledge and experience in the fields of physical and life sciences or social sciences and humanities.

- **Technicians and associate professionals (code 3)**

Occupations whose main tasks require technical knowledge and experience in one or more fields of physical and life sciences or of social sciences and humanities.

In this publication the term "*not working in S&T"* means people occupied in one of the following ISCO codes:

- **Not working in S&T (ISCO '88 codes 1, 4-9 and 0)**

1: Legislators, senior officials and managers; 4: Clerks; 5: Service workers and shop and market sales workers; 6: Skilled agricultural and fishery workers; 7: Craft and related trades workers; 8: Plant and machine operators and assemblers; 9: Elementary occupations; 0: Armed forces.

4. NACE

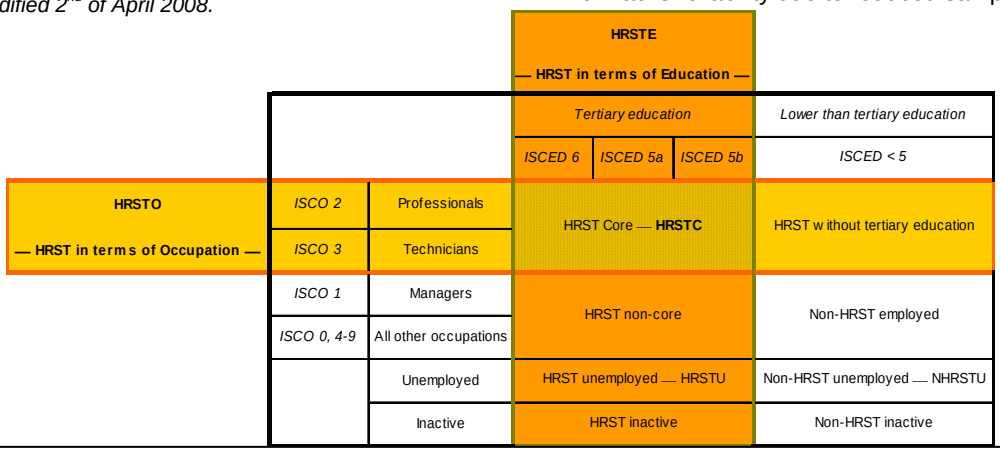
Data presented by sector of economic activity are based on the statistical classification of economic activities in the European Community, NACE Rev.1.1. The following sectors are used in this publication:

- **Manufacturing (15 to 37)**
- **Services (50 to 99)**

For further details on the NACE classification, please refer to the Internet site: http://ec.europa.eu/eurostat/ramon.

5. Statistical abbreviations and symbols

: Not available
u: Lacks reliability due to reduced sample size



[1] *This SIF was modified 2nd of April 2008.*

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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