

# High-tech knowledge-intensive services

## Mostly concentrated in capital regions

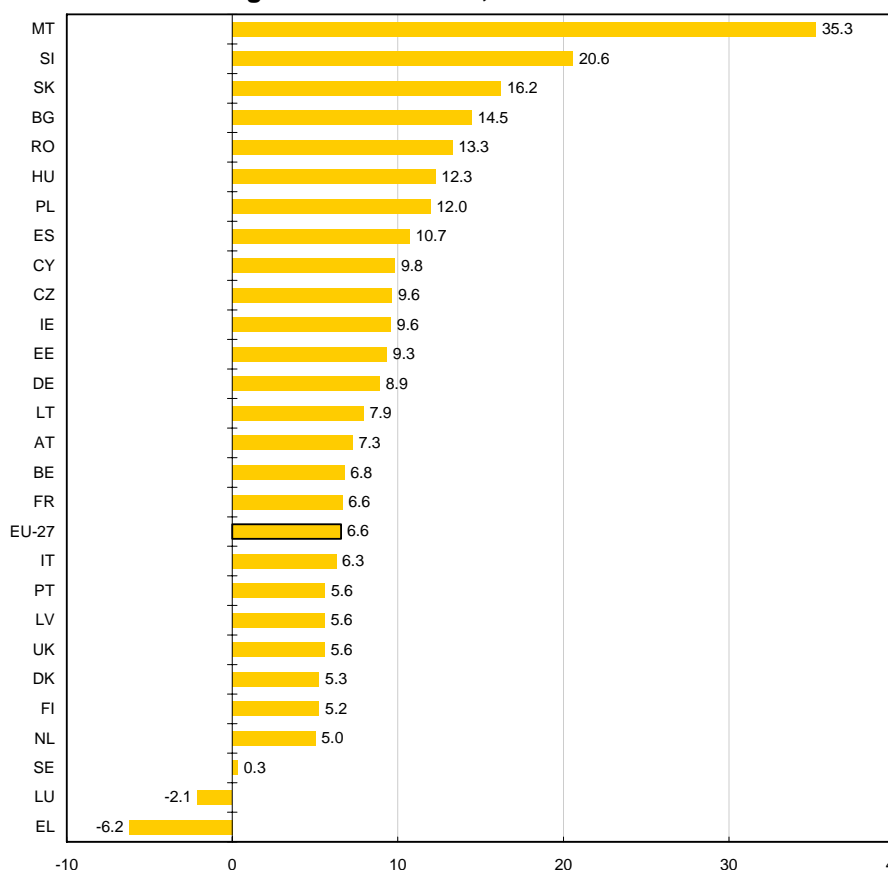


An essential source of innovation, knowledge-intensive services (KIS) and even more so high-tech KIS are often seen as major engines of growth in modern economies.

This Statistics in Focus details the high-tech KIS sector in the EU by analysing both economic and employment indicators at national and regional levels.

### United Kingdom's high-tech KIS account for a quarter of EU-27 total sector value added

Figure 1: Annual average growth rate (AAGR) of value added by the high-tech KIS sector, EU-27 — 2000-2005



EU-27: Eurostat estimation

Source: Eurostat's high-tech statistics

Exceptions to the reference period:

- 2000-2002: CY and LU;
- 2000-2004: IE and SE;
- 2001-2002: MT;
- 2002-2004: EL.
- 2003-2005: PL.

Value added is an important indicator for measuring economic output and shows the value added to a service (or product) by companies before it is offered on the market (see methodological notes on page 7). Although the value added by the EU's high-tech KIS sector increased at an average annual growth rate of 6.6% between 2000 and 2005, there were large disparities between countries (Figure 1).

Most of the new Member States (2004 and 2007 enlargements) experienced large growth while Luxembourg and Greece were the only Member States to see a decline in value added by the high-tech KIS sector.

## Statistics in focus

### SCIENCE AND TECHNOLOGY

18/2008

Author

Tomas MERI

### Contents

United Kingdom's high-tech KIS account for a quarter of EU-27 total sector value added..... 1

Women under-represented in high-tech KIS..... 4

High shares of employment in High-tech KIS in capital regions ..... 5



In 2005, the EU's high-tech KIS sector counted 634 thousand enterprises and generated a value added of EUR 437 billion (Table 2).

With almost one quarter of total EU value added, the United Kingdom was well ahead, followed by Germany, France, Italy and Spain. These five Member States together accounted for 75% of the value added by the EU's high-tech KIS sector.

The United Kingdom and Germany were the top two Member States also on the basis of turnover and gross operating surplus in absolute terms (EUR million). However, in terms of number of enterprises, the United Kingdom also ranked first (122 thousand) but was followed by Italy (105 thousand). At the other end of the scale, Malta and Cyprus had less than one thousand enterprises per country.

In the EU in 2005, the turnover, value added and gross operating surplus per enterprise in high-tech KIS reached respectively EUR 1.41 million, EUR 0.69 million and EUR 0.31 million.

Although Germany and Ireland clearly led in terms of turnover per enterprise in the high-tech KIS sector, value added was the highest in Cyprus, with EUR 1.86 million per enterprise. It was also above EUR 1 million in Germany, Ireland, France and Luxembourg.

Taking the indicator 'gross operating surplus per enterprise', Cyprus also ranked first. Even more strikingly, this was the only country exceeding EUR 1 million.

With the exceptions of Cyprus and Slovakia, all the Member States that joined the EU in 2004 and 2007 were at the end of the scale in terms of both turnover and value added per enterprise, together with Portugal.

Taking gross operating surplus per enterprise into account, eight of these new Member States were still among the countries at the end of the scale, along with Sweden and Portugal.

**Table 2: Description of the high-tech KIS sector, EU-27 — 2005**

	Number of enterprises	Turnover in EUR million		Value added at factor cost in EUR million		Gross operating surplus in EUR million	
		Total	Per enterprise	Total	Per enterprise	Total	Per enterprise
<b>EU-27</b>	<b>634 051 s</b>	<b>892 593 s</b>	<b>1.41 s</b>	<b>437 189 s</b>	<b>0.69 s</b>	<b>195 763 s</b>	<b>0.31 s</b>
BE	14 957	26 433	1.77	12 402	0.83	5 363	0.36
BG	4 069	2 098	0.52	1 037	0.25	730	0.18
CZ	24 868	7 344	0.30	3 561	0.14	2 086	0.08
DK	9 087	16 658	1.83	7 744	0.85	2 554	0.28
DE	60 131	163 235	2.71	82 662	1.37	35 282	0.59
EE	1 152	855	0.74	377	0.33	233	0.20
IE	6 045	16 348	2.70	8 077	1.34	5 691	0.94
EL	10 859	9 943	0.92	5 058	0.47	2 648	0.24
ES	36 772	60 320	1.64	28 748	0.78	16 212	0.44
FR	61 811	130 403	2.11	63 448	1.03	20 431	0.33
IT	105 358	102 537	0.97	47 036	0.45	24 894	0.24
CY	231	538	2.33	429	1.86	273	1.18
LV	1 477	940	0.64	502	0.34	345	0.23
LT	1 792	1 157	0.65	478	0.27	313	0.17
LU	1 095	2 210	2.02	1 211	1.11	638	0.58
HU	28 167	8 615	0.31	3 492	0.12	1 961	0.07
MT	684	314	0.46	230	0.34	155	0.23
NL	23 395	41 490	1.77	20 672	0.88	9 477	0.41
AT	13 908	15 570	1.12	7 179	0.52	2 977	0.21
PL	33 618	15 877	0.47	8 078	0.24	5 404	0.16
PT	15 644	10 755	0.69	4 618	0.30	2 780	0.18
RO	14 303	5 149	0.36	2 628	0.18	1 668	0.12
SI	3 351	2 217	0.66	981	0.29	446	0.13
SK	1 604	2 549	1.59	1 263	0.79	742	0.46
FI	5 557	12 860	2.31	5 340	0.96	1 675	0.30
SE	32 588	28 659	0.88	12 550	0.39	3 178	0.10
UK	121 528	207 519	1.71	107 389	0.88	47 610	0.39

Exceptions to the reference year:

2004: CZ, IE, EL, AT and SE;

2002: CY, LU and MT

Source: Eurostat's high-tech statistics

An average EU enterprise in the high-tech KIS sector generated a production value of EUR 1.30 million in 2005 (Figure 3).

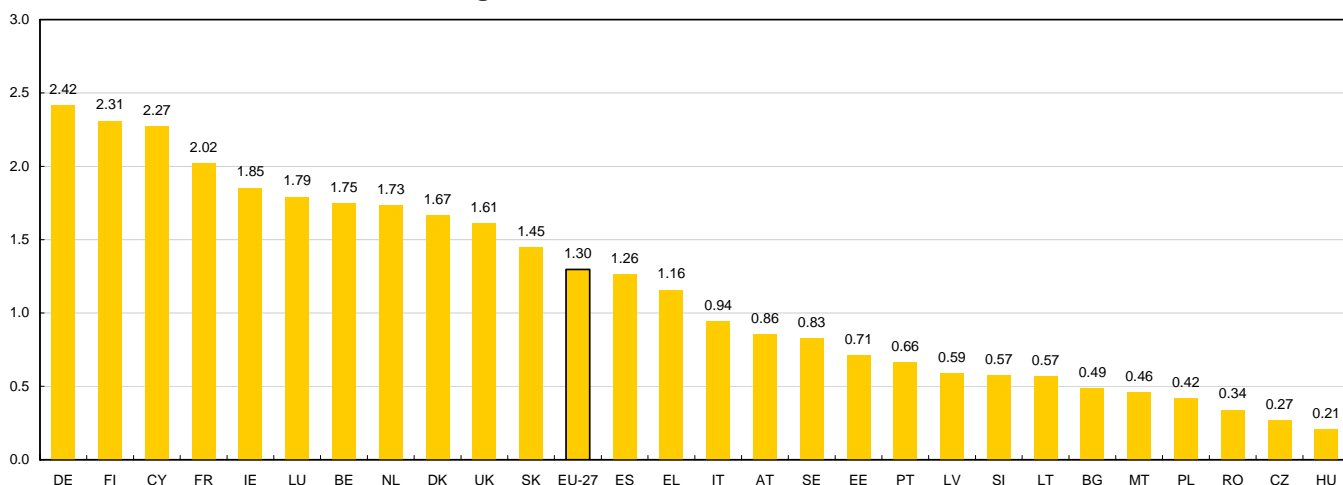
Germany ranked first with an average production value per enterprise of EUR 2.42 million, followed by Finland with EUR 2.31 million.

Nine other Member States are listed with production values per enterprise above the EU-27 average. Among them, Cyprus and to a lesser extent Slovakia were the only new Member States (2004 and 2007 enlargements). As for turnover and value added per enterprise (Table 2), all the other new Member States were together with Portugal lodged at the end of the scale with a production value per enterprise below EUR 0.8 million.

Comparing the investments in tangible goods (Figure 4) and the production value (Figure 3) of high-tech KIS enterprises, it can be highlighted that most of the countries where investments in tangible goods were significant also had a large production value. This was especially true for Cyprus, which ranked first in terms of investments in tangible goods.

With the main exception of Romania, investments were generally low in most of the Member States that were also at the end of the scale in terms of production value.

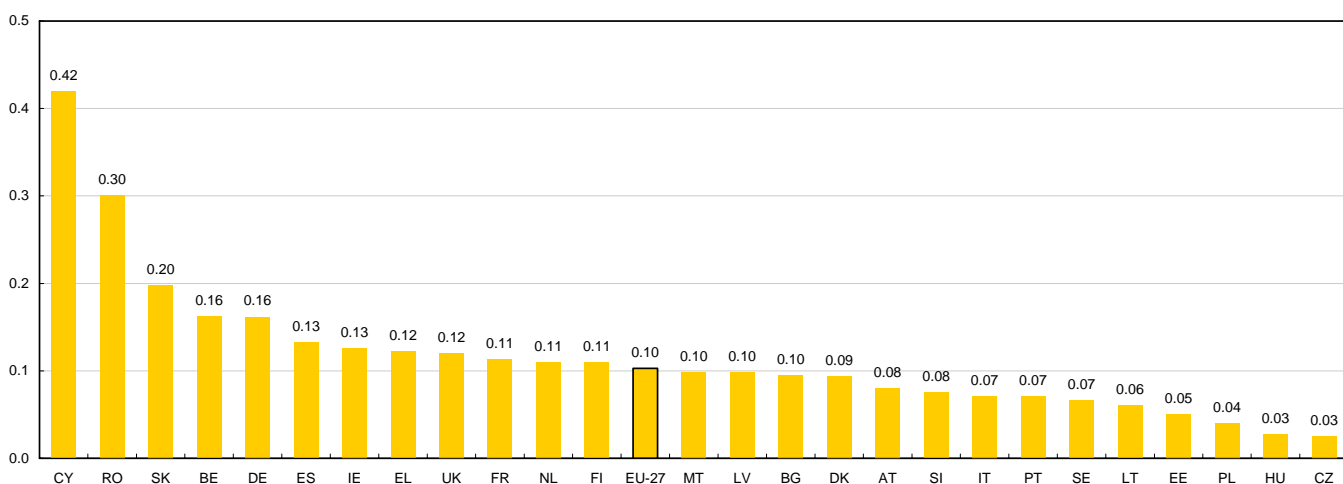
**Figure 3: Production value in EUR million per enterprise, high-tech KIS sector, EU-27 — 2005**



EU-27: Eurostat estimation  
 Exceptions to the reference year:  
 2004: CZ, IE, EL and SE;  
 2002: CY, LU and MT.

Source: Eurostat's high-tech statistics

**Figure 4: Gross investments in tangible goods in EUR million per enterprise, high-tech KIS sector, EU-27 — 2005**



EU-27: estimated excluding LU.  
 Exceptions to the reference year:  
 2004: CZ, IE, EL and SE;  
 2002: CY and MT.

Source: Eurostat's high-tech statistics

## Women under-represented in high-tech KIS

With almost one third (32.5%) of EU employment in 2006, the knowledge-intensive services (KIS) sector was responsible for more than 67 million jobs (Table 5).

Germany ranked first, with 12.7 million people employed in KIS, closely followed by the United Kingdom (12.1 million).

However, only one tenth of the jobs in KIS were in fact in high-tech KIS (6.8 million). Germany and the United Kingdom were the only Member States where employment in high-tech KIS added up to more than one million people.

As a percentage of total employment, Sweden had the greatest shares of employment in KIS and in high-tech KIS, with 47.7% and 5.1% respectively. In high-tech KIS, Sweden was followed by Iceland (5.0%), Finland (4.6%) and Denmark (4.4%). In other words, the high-tech KIS sector was most developed in countries in northern Europe.

In contrast, less than 2% of employed people were active in high-tech KIS in Portugal and in Romania.

Employment in KIS increased between 2001 and 2006 not only at EU level (2.9%) but also in all individual Member States.

Employment in high-tech KIS also increased in the EU (1.0%), but at a lower rate than in KIS (2.9%). Poland (8.9%) and Spain (6.5%) experienced the highest growth. However, twelve EU Member States together with Iceland, Norway, Switzerland and Croatia had a drop in employment in high-tech KIS.

While at EU level female employment clearly exceeded parity in KIS (60.4%), this was not true in high-tech KIS (32.9%).

With the exception of Malta, all countries exceeded parity in KIS, but the only country reaching over 50% of women in high-tech KIS was Lithuania.

**Table 5: Employment in KIS and high-tech KIS in thousands, as a percentage of total employment and percentage of women in 2006 and AAGR 2001-2006 <sup>(1)</sup>, EU-27 and selected countries**

	Knowledge-intensive services				High-tech knowledge-intensive services			
	in 1000s	as a % of total employment	AAGR 2001-2006	% of women	in 1000s	as a % of total employment	AAGR 2001-2006	% of women
<b>EU-27</b>	<b>67 358 s</b>	<b>32.5 s</b>	<b>2.9 s</b>	<b>60.4 s</b>	<b>6 793 s</b>	<b>3.3 s</b>	<b>1.0 s</b>	<b>32.9 s</b>
BE	1 621	38.4	1.4	58.9	158	3.7	-0.8	28.6
BG	683	22.0	1.4	64.9	80	2.6	1.5	47.4
CZ	1 209	25.1	1.4	63.6	142	2.9	-1.2	43.1
DK	1 220	43.5	1.0	62.6	123	4.4	-1.7	33.9
DE	12 715	34.1	2.4	60.6	1 294	3.5	2.0	32.4
EE	185	28.6	2.8	69.1	16	2.5	-3.6	:
IE	654	34.0	4.5	61.3	69	3.6	-0.6	30.5
EL	1 109	25.0	3.8	52.8	88	2.0	5.2	31.0
ES	5 514	27.9	6.7	56.9	589	3.0	6.5	31.6
FR	8 928	36.1	1.5	61.7	929	3.8	-0.8	36.8
IT	6 975	30.4	4.0	55.8	702	3.1	1.5	34.4
CY	101	28.3	4.3	60.1	7	2.0	4.5	31.1
LV	277	25.5	3.1	68.8	27	2.5	5.5	48.9
LT	383	25.6	0.8	70.2	31	2.1	1.7	54.0 u
LU	85	43.5	5.1	54.7	6	3.3	2.5	27.0
HU	1 117	28.4	1.9	64.6	134	3.4	1.6	40.5
MT	47	31.0	2.9	47.9	5	3.1	2.5	:
NL	3 432	42.0	1.3	59.5	312	3.8	-1.4	26.1
AT	1 194	30.4	2.0	59.6	108	2.8	-0.8	28.5
PL	3 589	24.7	4.0	65.9	346	2.4	8.9	39.5
PT	1 171	23.1	3.5	63.2	94	1.9	5.3	32.7
RO	1 356	14.6	2.7	63.0	150	1.6	-0.7	46.3
SI	250	26.2	3.5	63.0	26	2.7	1.1	28.6
SK	573	24.9	1.3	65.4	59	2.6	-1.6	43.7
FI	1 011	41.1	1.5	65.8	113	4.6	1.3	36.2
SE	2 111	47.7	1.1	62.5	224	5.1	-0.1	31.7
UK	12 126	43.0	1.9	59.8	1 186	4.2	-1.6	24.2
IS	70	43.1	2.0	64.6	8	5.0	-1.8	37.0
NO	1 042	45.7	1.2	62.8	91	4.0	-2.2	32.8
CH	1 665	41.3	1.7	55.4	153	3.8	-2.0	33.0
HR	363	23.0	2.5	62.2	33	2.1	-3.7	41.3 u

(1) AAGR is calculated on employment expressed in 1000s

Source: Eurostat's high-tech statistics

Exceptions to the reference year:

Exceptions to the reference period:

2005: BE, IE, IS and NO.

2001-2005: BE, IE, IS and NO;

2002-2006: HR;

2004-2006: PL.

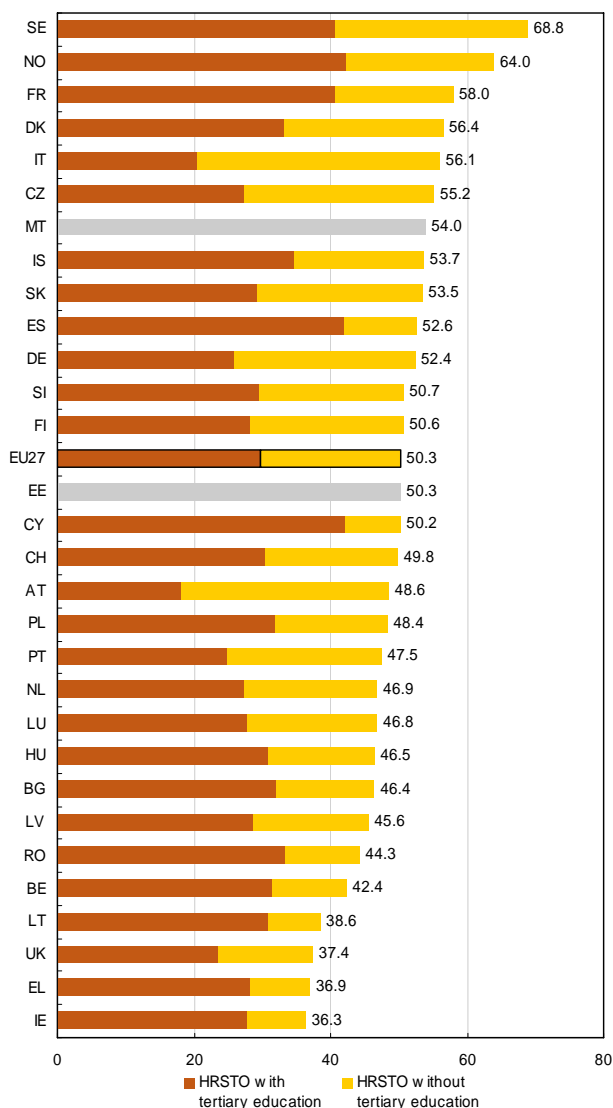
Human resources in science and technology in terms of occupation (HRSTO) are people working as professionals or technicians (see methodological notes on page 7). Figure 6 shows the share of HRSTO in the high-tech KIS sector and those with a tertiary education among the HRSTO.

In 2006, half (50.3%) of the employees in the EU high-tech KIS sector were HRSTO.

Sweden ranked first, with a share of HRSTO in employment of 68.8%. Norway also displayed a share above 60%. At the other end of the scale, Lithuania, the United Kingdom, Greece and Ireland did not reach 40%.

If only the shares of professionals and technicians with a tertiary education are taken into account, the ranking is different. Norway came first, followed by Cyprus, Spain, France and Sweden.

**Figure 6: Share of employment working as professionals or technicians (HRSTO) in high-tech KIS, EU-27 and selected countries — 2006**



Source: Eurostat's high-tech statistics

MT and EE: No detail concerning the level of education is available.

EU-27: Eurostat estimation.

Exceptions to the reference year:

2005: BE, IE, IS and NO.

## High shares of employment in High-tech KIS in capital regions

### Knowledge-intensive services and regional innovation: Is there a 'direct' link?

In spite of the fact that we are immersed in a global economy, in many aspects innovation is mainly a regional phenomenon, in which services, and in particular those called knowledge-intensive services (KIS)<sup>(1)</sup>, have acquired a central role.

Some studies, like the one by Makun and McPerson (1997), show that innovation rates are greater in those regions where a high concentration of KIS exists. They argue that, despite technological changes, like the rise of Internet, in the majority of cases the inter-regional trade in KIS is not possible, because of the need to establish "face to face" contacts in order to transmit tacit knowledge.

If we add to this need the local character of supplier-provider relationships in services (Wood, 1991), the result is that the regional level becomes the most adequate scope in which to study the role of KIS in innovation.

Using as starting point the theory of the "learning regions", Strambach (1998) describes two types of effects of KIS: direct and indirect. The direct effects refer to the development of KIS's own innovations, whereas the indirect effects are classified into four groups: knowledge transfer in the form of specialised technological knowledge or know-how management, integration of the different stocks of knowledge and competences, adaptation of existing knowledge to the specific needs of clients and production of new knowledge. [...]

Source: Joint Congress of the European Regional Science Association and ASRDLF (Association de Science Régionale de Langue Française), 2007.

(1) The industries included within the group of KIS are those referred to by Eurostat as 'high-tech knowledge-intensive services'.

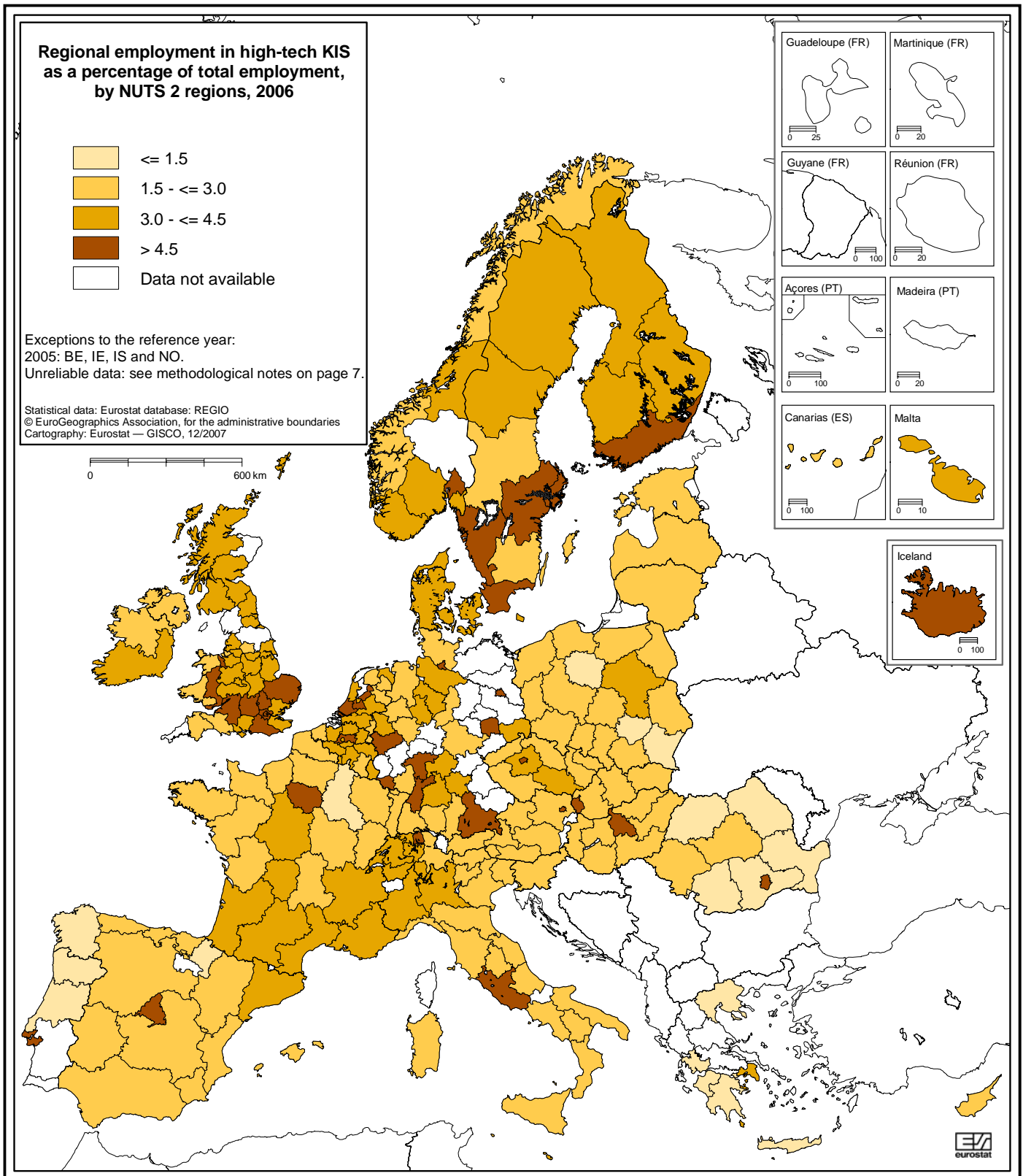
Map 7 provides an overview of the employment shares taken by high-tech KIS in 2006 across the regions of the EU and EFTA (NUTS 2 level).

With almost one tenth of employment in high-tech KIS (9.2%), the region Berkshire, Buckinghamshire and Oxfordshire (UK) led by a wide margin.

Several regions showing high shares of employment in the high-tech KIS sector were in fact capital regions. This was for example the case of Stockholm (SE), Oslo og Akershus (NO), Île de France (FR) and Comunidad de Madrid (ES).

In addition to the capital regions, regions with a significant proportion of employment in high-tech KIS were mainly located in Germany, in the United Kingdom and also in northern Europe. In contrast, the high-tech KIS sector generally employed fewer people in eastern and southern Europe.

Map 7: Regional employment in high-tech KIS as a percentage of total employment — 2006





## ➤ ESSENTIAL INFORMATION – METHODOLOGICAL NOTES

### Classification of high-tech knowledge-intensive services

Eurostat defines the following NACE Rev. 1.1 codes as knowledge-intensive services (KIS) and as high-tech KIS:

<b>Knowledge-intensive services (KIS)</b>	61	Water transport;
	62	Air transport;
	64	Post and telecommunications;
	65 to 67	Financial intermediation;
	70 to 74	Real estate, renting and business activities;
	80	Education;
<b>High-tech KIS</b>	85	Health and social work;
	92	Recreational, cultural and sporting activities
	64	Post and telecommunications;
	72	Computer and related activities;
	73	Research and development.

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

### Sources

Economic indicators are derived from the *Structural Business Statistics — SBS*. Employment data are derived from the *Community Labour Force Survey — CLFS*.

### Definitions

**Number of enterprises** is the count of the number of enterprises active during at least part of the reference period.

**Turnover** comprises the totals invoiced by the observation unit during the reference period, and this corresponds to market sales of goods or services supplied to third parties; it includes all duties and taxes on the goods or services invoiced by the unit, with the exception of the VAT invoiced by the unit to its customer and other similar deductible taxes directly linked to turnover; it also includes all other charges (transport, packaging, etc.) passed on to the customer. Price reductions, rebates and discounts as well as the value of returned packing must be deducted.

**Value added at factor costs** is the gross income from operating activities after adjusting for operating subsidies and indirect taxes. It can be calculated from turnover, plus capitalised production, plus other operating income, plus or minus changes in stocks, minus purchases of goods and services, minus other taxes on products which are linked to turnover but not deductible, minus duties and taxes linked to production. Alternatively it can be calculated from gross operating surplus by adding personnel costs.

**Production value** measures the amount actually produced by the unit, based on sales, including changes in stocks and the resale of goods and services. The production value is defined as turnover, plus or minus changes in stocks of finished products, work in progress and goods and services purchased for resale, minus purchases of goods and services for resale, plus capitalised production, plus other operating income (excluding subsidies). Income and expenditure classified as financial or extraordinary in company accounts is excluded from production value.

**Gross investment in tangible goods** is defined as investment during the reference period in all tangible goods. Included are new and existing tangible capital goods, whether bought from third parties or produced for

own use (i.e. capitalised production of tangible capital goods), having a useful life of more than one year, including non-produced tangible goods such as land. Investments in intangible and financial assets are excluded.

**Gross operating surplus** is the surplus generated by operating activities after the labour factor input has been recompensed. It can be calculated from value added at factor cost less personnel costs. It is the balance available to the unit which allows it to recompense the providers of own funds and debt, to pay taxes and eventually to finance all or part of its investment.

**Employment** includes persons aged 15-74 who during the reference week performed work, even for just one hour a week, for pay, profit or family gain or were not at work but had a job or business from which they were temporarily absent.

**Human resources in science and technology in terms of occupation (HRSTO)** are persons who are employed in an S&T occupation (ISCO '88 COM codes 2 or 3). Code 2 comprises *professionals* and code 3 *technicians and associate professionals*. HRSTO with tertiary education have successfully completed education at the third level (ISCED '97 version levels 5a, 5b or 6).

### NUTS

In this publication regional data are presented in accordance with the Nomenclature of Territorial Units for Statistics (NUTS), at NUTS level 2. More information on the NUTS classification can be found on the website:

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

### Quality of the data on employment

The guidelines on the quality of data established by the CLFS are applied to the database on high-tech industries and knowledge-intensive services. Regions for which no publishable quality has been achieved are therefore shown as not available.

Regions for which the data are classified as unreliable but publishable in Map 7 are:

AT21, AT32, AT33, BE34, BG12, BG13, CH07, ES13, ES22, FR21, FR25, GR23, GR25, GR43, ITD1, ITD2, ITF5, NL12, NL13, NL23, PL31, PL32, PL33, PL34, PL42, PL43, PL52, PL61, PL62, PL63 and RO41.

### Statistical abbreviations and symbols





AAGR	Annual average growth rate
HRSTO	Human resources in science and technology in terms of occupation
KIS	Knowledge-intensive services
s	Eurostat estimate
u	Lack reliability due to reduced sample size
:	Not available

Data presented in this Statistics in Focus shows the data availability in Eurostat's reference database as of 28 November 2007.

# Further information:

## Data:

### Science and technology

-  **High-tech industry and knowledge-intensive services**
-  High-tech industries and knowledge-intensive services: economic statistics at national level
-  High-tech industries and knowledge-intensive services: employment statistics at national and regional level
-  High-tech industries and knowledge-intensive services: science and technology statistics at national and regional level

---

#### Journalists can contact the media support service:

Bech Building Office A4/125  
L - 2920 Luxembourg

Tel. (352) 4301 33408  
Fax (352) 4301 35349

E-mail: [eurostat-mediasupport@ec.europa.eu](mailto:eurostat-mediasupport@ec.europa.eu)

#### European Statistical Data Support:

Eurostat set up with the members of the 'European statistical system' a network of support centres, which will exist in nearly all Member States as well as in some EFTA countries.

Their mission is to provide help and guidance to Internet users of European statistical data.

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

---

A list of worldwide sales outlets is available at the:

#### Office for Official Publications of the European Communities.

2, rue Mercier  
L - 2985 Luxembourg

URL: <http://publications.europa.eu>  
E-mail: [info@publications.europa.eu](mailto:info@publications.europa.eu)

---

This document was produced jointly with Sammy Sioen.