This article provides information on statistics on human resources in science and technology (HRST) which help us to better understand the demand for and the supply of people with strong qualifications in science and technology. It describes the current stock of HRST in the European Union, the candidate countries and the EFTA countries and gives information on the current and future supply of highly skilled people from universities and other specialised education institutions in the HRST field.

Investment in research, development, education and skills is a key policy area for the EU as it is essential to economic growth and to the development of a knowledge-based economy. There is therefore a great need to measure and analyse the most highly skilled part of the labour force, both within the EU and internationally.

Professionals and technicians employed in science and technology occupations

In 2017, almost 80.3 million people in the EU-28 aged from 15 to 74 were employed in science and technology (and therefore considered as human resources in science and technology by occupation — HRSTO), an increase of 2.1% compared with 2016. This made up almost three in ten of the active population.

In the same year, 74.4 million people in the EU-28 in the 25 to 64 age bracket were HRSTO, an increase of 1.9% compared with 2016. From this broad group 56% were ‘professionals’ and 49% were ‘technicians’. However, the percentage differed greatly between Member States. Lithuania and Romania, both with 72.2% reported the highest proportion of professionals. Other Member States with more than 65% professionals were Greece (71.2%), Luxembourg (68.4%), the United Kingdom (67.6%), and Ireland (66.9%). (see Figure 1).
The ‘professionals’ subgroup includes a special category of interest, ‘scientists and engineers’, covering people employed in science and engineering, health and information and communications technology. In 2017, scientists and engineers made up 20.6 % of people employed in science and technology occupations in the EU-28. In absolute terms, the number of scientists and engineers increased by 2.2 % in the EU-28 compared with 2016 and the largest group was found in the United Kingdom, with over three million scientists and engineers.

Among the ‘technicians’ subgroup, six Member States (Austria, the Czech Republic, France, Italy, Germany and Slovakia) account for more than 50 % (but less than 60 %) of HRSTO.

**Regional characteristics of highly-educated people in science and technology occupations**

The stock of human resources in science and technology can be used as an indicator of the development of the knowledge-based economy. The ‘core group’ (HRSTC), made up of people who have a university-level degree and are working in science and technology occupations, is key to the development of knowledge and technological innovation in all regions of the European Union.

The HRSTC category tends to be concentrated in capital cities and the surrounding regions, in regions with key universities and research institutions and in regions where large businesses have set up their headquarters and main research units. In 2017, 15 of the 25 regions with the highest HRSTC numbers in their labour force were capital cities (see Figure 2). The United Kingdom’s renowned capital city district, Inner London (which includes among other financial institutions the Royal Exchange and the Bank of England), topped the list with 46.2 % HRSTC, registering however a decrease in absolute terms of 3.2 % compared with 2016. It was followed by Oslo og Akershus (37.8 %), Helsinki-Uusimaa (36.4 %), and Stockholm (35.3 %).

The three Nordic capital regions were among the top ten regions. The top list also included a number of regions with key universities and research centres, such as the Brabant Wallon region in Belgium, Utrecht in the Netherlands, and Berkshire, Buckinghamshire and Oxfordshire in the United Kingdom.
In 2017, over 111 million people aged from 25 to 64 were employed in science and technology in the EU-28, which represents an increase of 1.8 % compared to 2016. Of these, more than 49.1 million were ‘senior’ HRST, i.e. between 45 and 64 years old. This corresponds to 44.2 % of HRST in the EU (by comparison, the 30 million people aged 25-34 in the HRST category in 2017 corresponded to 27.0 % of HRST in the EU).

Among the Member States, Germany has the largest share of senior HRST with 46.8 %. Finland, Denmark, the Netherlands and Italy also have more than 45 % of senior HRST (see Figure 3). At the other end of the scale, Malta (32.4 %) and Poland (33.0 %) have the smallest shares of senior HRST.
Women in science and technology

In most Member States there are at least as many women as men in university-level education, and the number of female doctorate students has increased more rapidly than the number of equivalent male students. It is therefore vital that we harness the expertise and qualifications of highly-skilled women in science and in technological innovation.

In 2017, 24.1 million women with a university-level education employed as professionals and technicians were working in service activities, compared to only 1.3 million in manufacturing activities in the EU-28. Overall, women hold the majority of jobs in science and technology in service activities. Switzerland and Turkey are exceptions with 48.9 % and 46.0 % respectively (see Table 1).
The situation is different in manufacturing, where at EU-28 level, women account for only 28.5 % of HRSTC. Latvia is the only Member State in which 50 % or more of HRSTC employed in manufacturing were women, reaching 54.5 %, followed by Estonia and Lithuania with 47.7 % and 48.1 % respectively.

Between 2008 and 2017, the average annual growth rate in the EU-28 for HRSTC women employed in the manufacturing sector was higher than for men, increasing by 3.6 % a year compared to 3 % for men. The same is true for HRST women employed in services sectors, where numbers grew by 3.4 % a year compared to 2.9 % for men.

Analysing HRST employment in terms of occupation by NUTS 1 regions shows that the highest numbers of women employed in science and technology occupations in 2017 can be observed in Lithuania and Latvia, both with 66.1 %, followed by Hungary (62.2 %) and Germany (60.9 %). Many women are also employed in science and technology in the Central and Eastern European Member States. The list of the top 25 regions includes all regions in both Poland and Bulgaria (with two regions for each of them) in the top ten, followed by three regions in Romania and two Hungarian regions (Alföld és Észak and Dunántúl), the first being among the top ten (see Figure 4).
Figure 4: The 25 NUTS 1 regions with the highest share of women in HRSTO, 2017 (%) Source: Eurostat (hrst_st_rsex)

Figure 5: HRST categories

Source data for tables and graphs
Human Resources in Science and Technology - Stocks: table and figures

Data sources
The data on the workforce in science and technology are obtained from the EU Labour Force Survey. Particular attention is paid to scientists and engineers, who are often the innovators at the centre of technology-led development.

The data on the workforce in science and technology cover employment status, occupation and education. Statistics are broken down by gender, age, region, sector of economic activity, occupation, educational level, fields of education, nationality and country of birth. Not all data combinations are possible.
Europe 2020

The Europe 2020 strategy sets out a vision of Europe’s social market economy for the 21st century. It aims to turn the EU into a smart, sustainable and inclusive economy that delivers high levels of employment, productivity and social cohesion. Innovation as a driver of economic progress is a key element of Europe 2020.

Europe 2020 advocates three mutually reinforcing priorities:

- **smart growth**: developing an economy based on knowledge and innovation;
- **sustainable growth**: promoting a more resource-efficient, greener and more competitive economy;
- **inclusive growth**: fostering a high-employment economy, delivering social and geographical cohesion.

Innovation Union

The European Commission is further boosting the Europe 2020 strategy with seven flagship initiatives. One of these is the 'Innovation Union', supporting 'smart growth'. The Innovation Union initiative seeks to improve both the framework for research and innovation in the EU and access to finance. The aim is to ensure that innovative ideas can be turned into products and services that create growth and jobs.

A key element of the Innovation Union involves completion of the European Research Area (ERA), aiming to increase the competitiveness of European research institutions by bringing them together and encouraging a more inclusive way of work. Increased mobility of knowledge workers and deeper cooperation among EU research institutions are central ERA goals.

The ERA should inspire the best talents to enter research careers in Europe and encourage industry to invest more in European research. It will enable European researchers to develop strong links with partners around the world, so that Europe benefits from the advancement of knowledge worldwide, contributes to global development and takes a leading role in international initiatives to solve issues that affect us all.
Methodology

Definitions

Eurostat uses harmonised concepts, methods and definitions to produce HRST statistics. It draws on the Manual on the Measurement of Human Resources devoted to Science and Technology, the 'Canberra Manual', jointly written by the OECD, UNESCO, the International Labour Organisation, the European Commission’s Directorate-General for Research and Innovation and Eurostat.

The Canberra Manual describes highly skilled human resources as essential for the development and flow of knowledge and as forming the crucial link between technological progress and economic growth, social development and environmental well-being. Countries and international organisations have highlighted the political and economic importance of internationally comparable, harmonised and high-quality data on human resources.

The Manual defines human resources in science and technology as persons fulfilling at least one of the following two conditions (see Figure 5):

- human resources in terms of education: individuals who have successfully completed a university-level education (HRSTE);
- human resources in terms of occupation: individuals who are employed in a science and technology occupation as 'Professionals' or 'Technicians and associate professionals' (HRSTO).

The group that fulfils both of these criteria is called the HRST core (HRSTC).

Comparability of concepts and data

Since statistics on the number of people and the mobility of human resources in science and technology are all sourced from Eurostat’s Labour Force Survey, they can be compared to and combined with each other and with the part of the high-tech statistics relating to employment in high-tech sectors and knowledge-intensive activities. Nevertheless, users should pay close attention to concepts and definitions when comparing or combining HRST statistics with statistics from other domains and/or sources.

For example, 'total HRST' cannot be compared with total employment, as total HRST also covers unemployed and inactive HRST. If comparisons need to be made, either the 'HRST in terms of occupation' or the 'HRSTC' subgroups, or a HRST table that explicitly contains only HRST who are employed, could be used.

Comparisons between HRST numbers, mobility statistics and statistics on HRST education inflow must be drawn with caution, as the sources for these statistics apply a different methodology. For example, a HRST table showing the field of education cannot be compared to one showing employed HRST, because only 'HRST in terms of education' covers the education dimension (not all employed HRST have a university-level education).

Legislation

- Decision 1608/2003/EC concerning the production and development of Community statistics on science and technology (Legal text)
External links

- European Commission - Europe 2020
- European Commission - Research - ERA
- Innovation Union Competitiveness Report 2011