Statistics in focus

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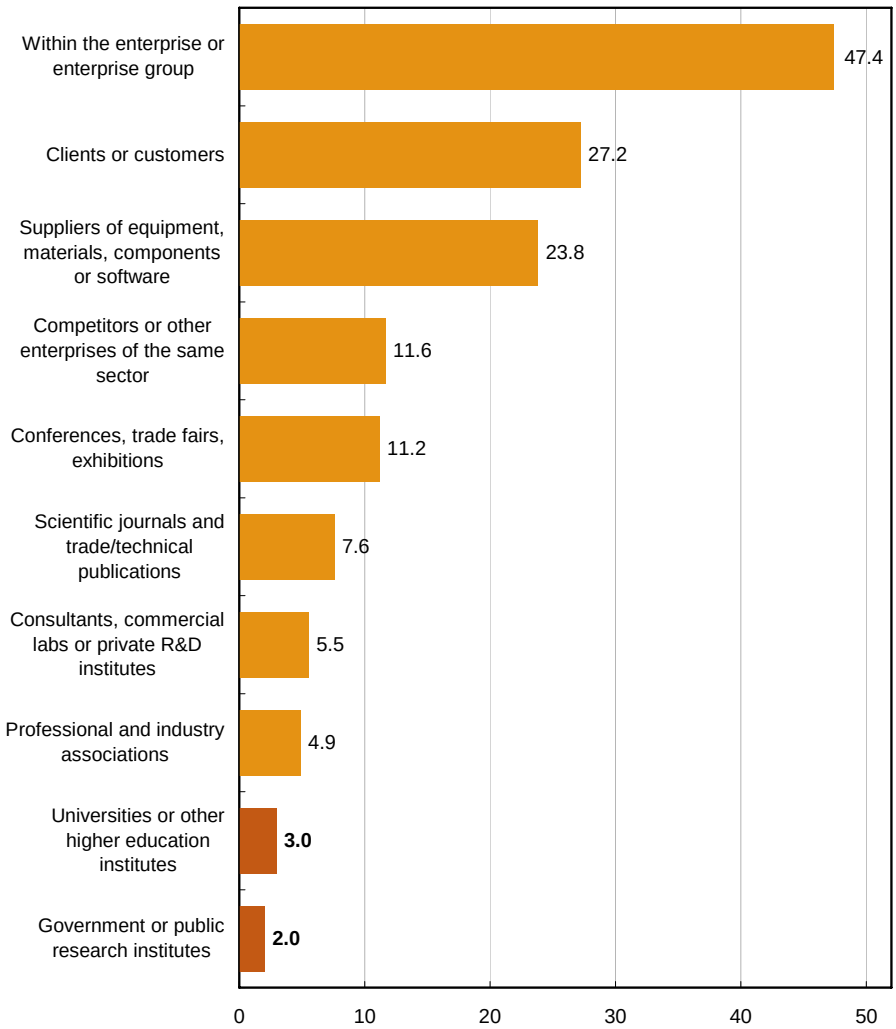
Community Innovation Statistics

Weak link between innovative enterprises and public research institutes/universities

This report puts the spotlight on two different facets of innovation among those screened by the Fourth Community Innovation Survey (CIS 4): the sources of information that are highly important for innovation, and the types of partners with which innovative enterprises cooperate.

The outcome for both aspects is similar: the link between publicly financed science and innovative industry is rather weak. Institutional sources are less frequently consulted than internal or market sources; and innovative enterprises find cooperation partners more easily among suppliers or customers than in universities or public research institutes.

Figure 1: Sources of information identified by enterprises as highly important for the enterprise's innovation activities, as a percentage of innovative enterprises, EU-27 average



Source: Eurostat – Community Innovation Statistics, 2004

EU-27: Eurostat estimate excluding missing/confidential/unreliable data (LV, AT, PT, SI, SE and UK)

Highly important sources of information for innovation during 2002-2004

Table 2: Highly important sources of information for innovation, as a percentage of innovative enterprises, EU-27 Member States and Norway

	Internal sources	Market sources				Institutional sources		Other sources		
	Within the enterprise or enterprise group	Suppliers of equipment, materials, components or software	Clients or customers	Competitors or other enterprises of the same sector	Consultants, commercial labs or private R&D institutes	Universities or other higher education institutes	Government or public research institutes	Conferences, trade fairs, exhibitions	Scientific journals and trade/technical publications	Professional and industry associations
EU-27	45.7	23.2	26.7	12.2	5.7	3.6	2.7	11.5	8.3	5.5
Belgium	54.7	30.0	38.9	18.3	4.3	3.8	2.3	12.9	8.9	7.6
Bulgaria	33.1	26.7	33.1	16.7	7.0	5.4	3.3	18.5	16.3	7.9
Czech Republic	39.4	23.2	32.1	14.3	4.5	3.0	1.4	14.2	7.4	3.3
Denmark	56.2	27.6	32.4	8.1	7.7	3.3	0.5	5.7	5.4	2.7
Germany	53.3	21.6	35.0	13.9	2.6	3.4	1.4	11.0	6.5	4.8
Estonia	34.1	22.6	25.6	11.3	4.2	3.3	2.1	14.0	5.5	2.3
Ireland	64.3	36.4	49.9	14.6	5.7	2.7	2.8	16.1	11.2	4.7
Greece	46.2	42.6	25.5	17.5	10.2	4.4	2.3	31.9	21.5	8.1
Spain	45.1	30.2	19.6	10.5	5.5	3.2	4.4	8.6	4.3	4.5
France	54.5	20.3	25.6	7.9	4.6	2.3	2.0	6.9	6.9	3.5
Italy	36.3	21.8	13.8	5.6	10.7	2.0	1.0	8.9	5.6	5.8
Cyprus	85.9	50.6	22.1	27.9	25.3	2.8	2.8	36.4	18.5	7.0
Lithuania	32.2	15.8	19.1	8.6	7.1	1.1	2.1	13.5	6.4	2.9
Luxembourg	64.9	36.8	36.6	16.8	8.7	5.4	4.4	26.3	19.1	14.0
Hungary	41.7	23.4	28.2	17.7	6.5	4.7	1.2	12.6	9.9	5.5
Malta	48.6	21.5	27.8	16.0	4.9	2.8	-	16.7	10.4	5.6
Netherlands	45.0	20.9	27.0	11.0	3.9	2.6	2.0	6.9	3.7	5.4
Poland	48.0	19.7	32.5	20.8	-	3.5	4.2	22.2	19.2	-
Portugal	: u	: u	: u	: u	: u	: u	: u	: u	: u	: u
Romania	38.0	37.6	30.9	19.1	4.9	2.7	2.6	23.0	22.8	6.4
Slovenia	: c	: c	: c	: c	: c	: c	: c	: c	: c	: c
Slovakia	37.1	23.7	30.1	12.4	3.0	1.8	1.1	13.3	8.3	3.4
Finland	56.9	15.8	38.1	8.3	2.4	4.9	2.4	8.0	5.3	2.0
Norway	52.1	20.0	35.0	9.4	6.2	3.1	3.2	8.7	4.7	4.6

Source: Eurostat – Community Innovation Statistics 2004

EU-27: Eurostat estimate excluding missing/confidential/unreliable data (LV, AT, PT, SI, SE and UK)

Information plays a key role for innovation, so it is vital to identify the most important sources of information for innovative enterprises.

Sources of information can be split into four main groups: internal sources, market sources, institutional sources and other sources. At EU-27 level, enterprises engaged in innovation tend to use internal sources and market sources more often than institutional sources. This is a very general observation that needs to be further developed by taking a closer look at the national level and at the different sources of information.

Whereas in most of the countries between 40 % and 50 % of innovative enterprises use information available inside their enterprise or enterprise group, there are exceptions to this rule. In Cyprus 86 % of innovative enterprises exploit internal sources while, at the other end of the scale, in Lithuania only 32 % of innovative enterprises do so.

The use of market sources varies according to the source considered. At EU-27 level the most widely used market sources are clients or customers, followed by suppliers. Competitors rank third and commercial consultants last. Nearly one in two Irish innovative enterprises declares their clients or customers to be highly important sources of information whereas in Italy this is the case for just 14 % of innovative enterprises. In Cyprus more than 50 % of innovative enterprises get information from their suppliers of equipment, materials, components or software whereas in Finland only 16 % use this source. 12 % of EU enterprises engaged in innovation consider competitors or other enterprises in the same sector to be highly important sources of information. In Cyprus this percentage is nearly 28 % but only 6 % in Italy. The percentages for the last market source, made up by consultants, commercial labs or private R&D institutes, vary between 2 % in Finland and 25 % in Cyprus.

The CIS 4 questionnaire distinguishes two institutional sources of information: universities or other higher education institutes and government or public research institutes. At EU-27 level, neither of the two institutional sources seems to be very important for innovative EU enterprises. In nearly all countries these information sources are quoted less frequently than internal or market sources.

The three other sources of information are more important for innovation and knowledge transfer. These sources are conferences, trade fairs, exhibitions; scientific journals and trade/technical publications; and professional and industry associations. The first of these is highest in Cyprus (36 %), where it ranks third among all sources of information. Whereas 23 % of the Romanian innovative enterprises appreciate scientific journals and trade/technical publications as most important source of information, in Luxembourg, 14 % of the innovative enterprises consider professional and industry associations as most important source of information. In general, the other sources seem to be slightly less important than internal and market sources but they are more often mentioned as a highly important source than European universities and public research institutes.

These figures show that the link between science and industry is markedly weak in Europe and needs to be strengthened. One aim among others that national governments and European institutions are trying to achieve by funding research programmes at universities and public research entities is to create a kind of domino effect. Active and successful public research should stimulate research in the business enterprise sector. But there should also be some interaction between both sectors. Commercial gains from research should help to finance public research.

We need to find out why innovative enterprises do not make more intensive use of the knowledge generated by universities and public research entities. Is their research too theoretical to be applied for industrial purposes? Is public research too expensive for industry to afford? Do researchers decide not to stay in the public sector but prefer to go the business sector where they are better paid? Or are there other reasons that hamper knowledge transfer?

The first '**Competitiveness and Innovation framework Programme (CIP)'** is a coherent and integrated response to the objectives of the renewed Lisbon strategy. Running from 2007 to 2013, it has a budget of approximately EUR 3.6 billion. It represents a 60 % increase in annual spending on actions related to competitiveness and innovation by 2013 compared to 2006.

The three specific programmes in the CIP framework are:

- Entrepreneurship and Innovation Programme
- ICT Policy Support Programme
- Intelligent Energy-Europe Programme.

Eco-innovation will be a cross-cutting theme of the entire programme.

Source: http://ec.europa.eu/enterprise/enterprise_policy

The need for action

One major problem is how to make better use of publicly funded R&D. Compared to North America, the average university in Europe generates far fewer inventions and patents. This is largely due to less systematic and professional management of knowledge and intellectual property by European universities. Moreover, efficient knowledge transfer in European research institutions is hindered by a range of factors, including: cultural differences between the business and science communities; lack of incentives; legal barriers; and fragmented markets for knowledge and technology. All of these factors adversely affect European growth and job creation.

Source: 'Improving knowledge transfer between research institutions and industry across Europe: embracing open innovation', Communication from the European Commission, Brussels, 4.4.2007, COM(2007) 182 final

Innovative enterprises cooperate with different types of partners at percentages varying between 56 % in Lithuania and 13 % in Italy. Figure 3 shows that on average one out of three enterprises engaged in innovation in the EU-27 cooperates with at least one partner, if not more. There is no general rule but the northern and eastern countries seem to cooperate more easily. Lithuania, with the highest score, is followed by Slovenia, Finland, Sweden and Denmark. The other end of the scale is made up by Bulgaria, Portugal, Spain and Romania, followed by Austria, Germany and at the very end Italy.

The CIS 4 questionnaire distinguished between seven different cooperation partners (see Table 4). At EU-27 level, the cooperation partners with the highest scores (between 9 % and 17 %) are other market players such as suppliers or clients. 10 % of innovative enterprises in the EU cooperate with other enterprises belonging to the same enterprise group. Between 6 % and 9 % of EU enterprises engaged in innovation choose to cooperate with universities or public research institutes.

Having analysed the sources of information, a second facet of innovation, namely the cooperation partners, seems to confirm the weakness of the link between science and industry. However, the EU average may hide national differences that are worth being looked at in more detail.

An efficient science-industry interface involves:

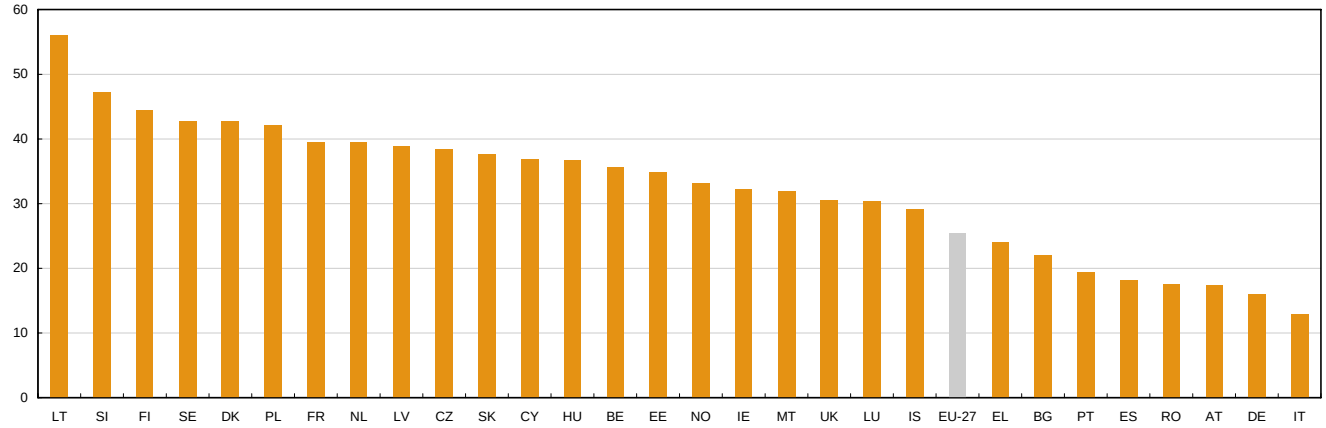
- Cooperation (e.g. joint laboratories);
- Efficiently functioning markets for knowledge – involving spin-off firms, mechanisms for patenting and licensing, research contracts and labour mobility between science and industry;
- Efficient bridging institutions and platforms, e.g. incubators, science parks, intermediaries, clusters;
- Social and professional networks, e.g. through joint publication, conferences and expos, informal contacts;
- Flows of graduates from science to industry.

Policies to promote industry-science relationships

- Entrepreneurship (new technology-based firms, including spin-offs);
- Patenting (licensing IPR that results from publicly funded research);
- Cooperation (joint projects involving scientists and innovators);
- Public-private partnerships for research and Innovation (P/PPs).

Source: John Dryden, OECD, EC Conference on Regions for Economic Change, Brussels, 12-13 June 2006

Figure 3: Shares of enterprises having cooperation partners by country, as a percentage of innovative enterprises, EU-27 and selected countries



Source: Eurostat – Community Innovation Statistics 2004

Table 4: Different types of cooperation partners of enterprises by country, as a percentage of innovative enterprises, EU-27 Member States and selected countries

	All types of co-operation	Other enterprises within your enterprise group	Suppliers of equipment, materials, components or software	Clients or customers	Competitors or other enterprises of the same sector	Consultants, commercial labs, or private R&D institutes	Universities or other higher education institutions	Government or public research institutes
EU-27	25.5	9.5	16.5	13.9	8.3	8.9	8.8	5.7
BE	35.7	16.9	25.9	21.2	9.5	15.0	13.2	9.2
BG	22.0	4.9	16.2	13.4	7.6	7.5	6.0	3.9
CZ	38.4	13.5	30.7	26.1	15.3	15.0	13.1	7.4
DK	42.8	17.4	28.4	27.8	14.8	19.0	13.7	6.9
DE	16.0	5.2	7.0	8.1	4.3	2.9	8.5	4.1
EE	34.8	15.6	23.3	22.9	18.5	10.0	8.6	6.1
IE	32.3	16.7	23.2	25.2	6.0	10.1	10.1	5.7
EL	24.0	3.6	11.0	7.8	11.3	6.5	6.4	2.5
ES	18.2	3.8	9.5	4.2	3.0	4.1	4.7	5.2
FR	39.5	16.6	25.7	19.8	14.1	12.7	10.1	7.3
IT	13.0	3.0	7.3	5.1	4.8	6.4	4.7	1.5
CY	37.0	5.9	24.5	4.2	12.8	16.9	2.2	1.7
LV	38.8	6.1	32.6	28.7	25.1	18.3	13.8	12.2
LT	56.1	16.7	45.5	34.5	25.4	24.9	12.0	9.6
LU	30.5	20.3	24.0	22.2	14.9	11.0	10.0	8.2
HU	36.8	10.1	26.2	19.6	13.6	12.6	13.7	5.0
MT	31.9	16.0	22.2	16.7	5.6	13.9	4.2	4.2
NL	39.4	17.5	29.7	21.8	12.3	15.0	12.4	9.4
AT	17.4	8.2	7.5	7.8	3.9	7.3	10.0	5.2
PL	42.2	12.7	28.2	16.4	8.5	7.9	6.2	8.7
PT	19.4	5.7	13.9	11.5	6.8	8.7	7.5	4.8
RO	17.5	8.7	13.8	10.0	6.6	4.9	3.7	4.3
SI	47.3	15.0	37.5	33.0	20.4	19.7	19.5	13.2
SK	37.7	14.0	31.7	30.2	21.2	18.6	14.8	11.4
FI	44.4	23.5	40.8	41.4	34.2	32.7	33.2	26.4
SE	42.8	17.2	32.0	27.9	10.8	19.8	17.4	6.4
UK	30.6	14.8	22.6	22.3	11.1	12.6	10.0	7.6
IS	29.1	5.3	19.8	19.8	13.8	6.7	5.0	13.1
NO	33.2	14.0	23.1	22.3	11.9	20.3	14.8	16.3

Source: Eurostat – Community Innovation Statistics 2004

The further analysis should take into account that the results of Figure 3 and Table 4 show only the shares of innovative enterprises that cooperate but gives no precise information about the number of the underlying cooperation partners. That number can only be estimated.

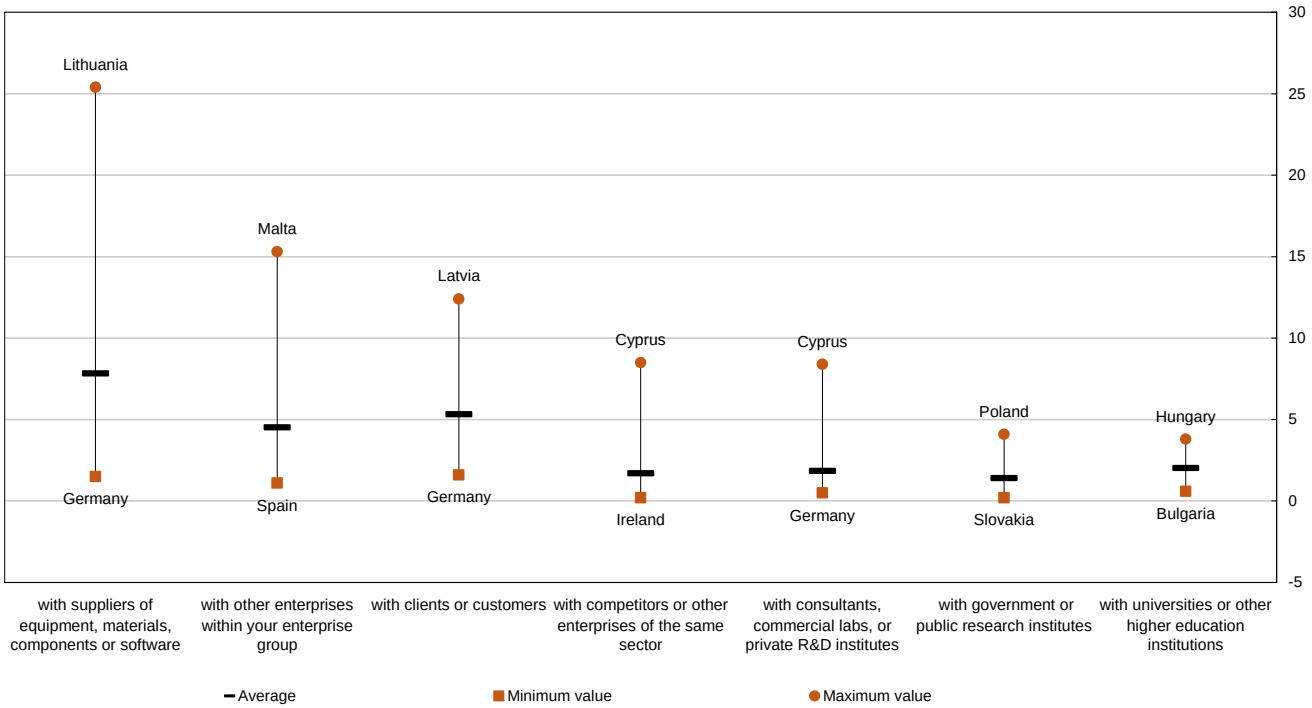
As an example we can take two countries which have high shares of total cooperation in innovation: Lithuania and Finland. Lithuania leads in total cooperation but the country has the highest percentage (46 %) only for co-operation with suppliers of equipment, materials, components or software. For all the other cooperation partners Finland has higher shares. It can be estimated that Lithuanian innovative enterprises active in cooperation have about three cooperation partners whereas Finnish enterprises have on average five different cooperation partners.

In general, innovative enterprises that are cooperating have more than one cooperation partner, mostly two or three.

At EU level the public sector is not a very important cooperation partner for innovative enterprises, but in several Member States it plays a more essential role in the innovation process. In Finland – a country that is advanced in the knowledge economy – one out of three innovative enterprises cooperates with a university or another higher education institution. In Slovenia, this is the case for nearly one out of five innovative enterprises. More than one out of four Finnish enterprises engaged in innovation also cooperate with government or public research institutes. Here Slovenia also has the second highest share, with 13 %.

In Cyprus only 2 % of innovative enterprises state that they cooperate with universities, and close to 2 % of Italian innovative enterprises work together with public research institutes.

Figure 5: National disparities in the evaluation of the most valuable type of cooperation partner, as a percentage of innovative enterprises, EU-27 Member States



Source: Eurostat – Community Innovation Statistics 2004

EU-27: Eurostat estimate excluding missing/confidential countries (IT, AT, SI, SE and UK).

The CIS 4 questionnaire also asks innovative enterprises to choose the most valuable method of cooperation. The opinions of the enterprises spread very widely, in particular concerning the choice of suppliers of equipment, materials, components or software as the most valuable cooperation method. Whereas this cooperation method is preferred by far in Lithuania it is not very widely used in Germany. This outcome may be explained by the fact that German innovative enterprises are among those that declared themselves the least active in cooperation overall.

Poland and Hungary have the highest shares of innovative enterprises that consider cooperation with the institutional sector to be the most valuable cooperation method.

Seventh Framework Programme (FP7) and cooperation

FP7 bundles together under a common roof all research-related EU initiatives playing a crucial role in achieving the goals of growth, competitiveness and employment, along with a new Competitiveness and Innovation Framework Programme (CIP), Education and Training programmes, and Structural and Cohesion Funds for regional convergence and competitiveness. It is also a key pillar of the **European Research Area (ERA)**. The broad objectives of FP7 have been grouped into four categories: Cooperation, Ideas, People and Capacities. For each type of objective, there is a specific programme corresponding to the main areas of EU research policy.

The specific programme on **Cooperation** supports all types of research activities carried out by different research bodies in transnational cooperation and aims to gain or consolidate leadership in key areas of science and technology. FP7 allocates EUR 32 413 million to the Cooperation programme. The budget will be devoted to supporting cooperation between universities, industry, research centres and public authorities throughout the EU and beyond.

The Cooperation programme is sub-divided into ten distinct themes. Each theme is operationally autonomous but aims to maintain coherence within the Cooperation Programme and allow for joint activities cutting across different themes, through, for example, joint calls.

The ten identified themes reflect the most important fields of knowledge and technology where research excellence is particularly important to improve Europe's ability to address its social, economic, public health, environmental and industrial challenges for the future. Their continued relevance will be guaranteed by relying on a number of sources from the research sector, including the European Technology Platforms (ETPs). Important themes identified in the Strategic Research Agendas (SRAs) developed by the ETPs are therefore covered by the Cooperation programme.

Source: http://cordis.europa.eu/fp7/home_en.html

➢ ESSENTIAL INFORMATION – METHODOLOGICAL NOTES

The Community Innovation Survey (CIS) is a survey of innovation activity in enterprises covering EU Member States, candidate countries, Iceland and Norway.

The data are collected on a two-yearly basis (from 2004 onwards). The latest survey (CIS 4) was carried out in 25 Member States, candidate countries, Iceland and Norway in 2005 based on the reference year 2004.

In order to ensure comparability across countries, Eurostat, in close cooperation with the EU Member States and other countries, developed standard core questionnaires for CIS 4, with an accompanying set of definitions and methodological recommendations.

CIS 4 is based on the *Oslo Manual* (2nd edition, 1997), which gives methodological guidelines and defines the concept of innovation, and on Commission Regulation No 1450/2004.

This Statistics in Focus compares data compiled on the basis of the CIS 4 survey.

STATISTICAL UNITS

The main statistical unit for CIS 4 was the enterprise, as defined in Council Regulation No 696/1993 on statistical units or as defined in the national statistical business register. EU Regulation No 2186/1993 requires Member States to set up and maintain a register of enterprises, as well as associated legal units and local units.

TARGET POPULATION

The population of CIS 4 is determined by the size of the enterprise and its principal activity. At least all enterprises with 10 or more employees in any of the specified sectors were included in the statistical population.

The target population of CIS 4 was the total population of enterprises with mostly the following market activities: mining and quarrying (NACE 10-14), manufacturing (NACE 15-37), electricity, gas and water supply (NACE 40-41), wholesale trade (NACE 51), transport, storage and communication (NACE 60-64), financial intermediation (NACE 65-67), computer and related activities (NACE 72), architectural and engineering activities (NACE 74.2) and technical testing and analysis (NACE 74.3)

TYPE OF SURVEY

Most Member States and other countries carried out CIS 4 by means of a stratified sample survey, while a number of countries used a census or a combination of both.

The CIS 4 data are organised in the Eurostat reference database following broadly the same structure as the harmonised survey questionnaire.

REFERENCE PERIOD

For CIS 4 the observation period covered was 2002-2004 inclusive, i.e. the three-year period from the beginning of 2002 to the end of 2004. The reference period for CIS 4 was the year 2004.

All countries covered collected data for this observation period; only the Czech Republic took 2003-2005 as the observation period.

DEFINITION (Oslo Manual, 1997)

Innovation: a new or significantly improved product (good or service) introduced to the market or a new or significantly improved process introduced within an enterprise. Innovations are based on the results of new technological developments, new combinations of existing technology or the utilisation of other knowledge acquired by the enterprise.

Enterprises engaged in innovation activity (propensity to innovate): enterprises that introduce new or significantly improved products (goods or services) to the market or enterprises that implement new or significantly improved processes. Innovations are based on the results of new technological developments, new combinations of existing technology or the utilisation of other knowledge acquired by the enterprise. The term covers all types of innovator, i.e. product innovators, process innovators and enterprises with only ongoing and/or abandoned innovation activities.

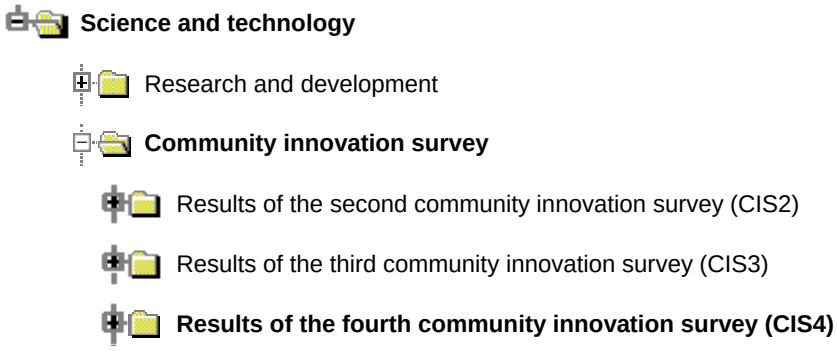
SYMBOLS AND ABBREVIATIONS

c	Confidential data
:	Not available
u	unreliable data

Data presented in this publication reflect the data available in Eurostat's reference database on 10 April 2007.

Further information:

Data: EUROSTAT Website/Home page/Science and technology/Data



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This publication was prepared in collaboration with Gesina Dierickx.