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REPORT FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT

on the implementation of Decision No 1608/2003/EC of the European Parliament and of the Council

EXECUTIVE SUMMARY

The statistics on science, technology and innovation (STI statistics) are based on the Decision of the European Parliament and of the Council No 1608/2003/EC. In close co-operation with Member states, this Decision has been implemented by Eurostat in the form of legislative measures on the one hand and as additional work going beyond that on the other hand.

Two Commission Regulations relating to STI statistics (No. 753/2004 and No. 1450/2004) were adopted in 2004. These relate to statistics on science and technology on the one hand and to statistics on innovation on the other hand. These two legislative measures led to considerable improvements of R&D statistics and the Community innovation statistics. Additional progress has been made on the statistics on the career development of doctorate holders (CDH statistics), on high tech statistics and on patents statistics. The statistics and indicators produced were used in numerous publications and policy papers (e.g. in the European Innovation Scoreboard). The community measures also led to adaptations of the national statistical systems on STI statistics.

The two Commission Regulations also improved the data quality of STI statistics considerably. This is in particular true for R&D statistics and Community Innovation statistics. Further data quality improvements are however necessary.

A first attempt of measuring the costs and burden of STI statistics on respondents and national authorities was undertaken. Heterogeneous results were reported by countries. Therefore no clear conclusions can be made yet. The work needs to be pursued.

The further development of STI statistics is on the one hand necessary with regard to the improvements to be made on existing statistical domains. Progress should e.g. be achieved in increasing the relevance of R&D statistics, in revising the concepts and definitions of HRST statistics, in stabilising the CDH statistics, in better using the patent statistics raw database PATSTAT or in revising the definitions of high tech statistics.

More in the medium and longer term, further actions seem necessary such as the improvement of the measurement of the internationalisation of STI, the better access to the STI micro-data or the improvement of the indicators measuring knowledge flows, linkages, STI output and impact. This should also go hand in hand with the overhaul of the two Commission Regulations mentioned above as well as with the adding of an additional Commission Regulation on CDH statistics.

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1. INTRODUCTION

This Report from the Commission concerns the implementation of Decision No 1608/2003/EC of the European Parliament and of the Council of 22 July 2003 on the production and development of Community statistics on science and technology[1] as required by Article 5 of the same Decision.

In the Commission's Annual Policy Strategy for 2008, the statistics on science, technology and innovation ("STI statistics") are closely linked to the Lisbon Strategy for growth and jobs and to prosperity in which education, research and innovation rank highly.

The first part of this report focuses on implementation since the Decision was adopted. It is followed by chapters on data quality, costs and the statistical burden. The final chapter of the report looks ahead to the strategic actions which should be taken in the years to come.

2. IMPLEMENTATION OF DECISION NO 1608/2003/EC

2.1. The implementation by the Commission

Decision No 1608/2003/EC has been implemented by Eurostat in the form of legislative measures on the one hand and additional work going beyond that on the other hand.

Two Commission Regulations relating to STI statistics were adopted in 2004:

- Commission Regulation (EC) No 753/2004 of 22 April 2004 implementing Decision No 1608/2003/EC of the European Parliament and of the Council as regards statistics on science and technology[2]; and
- Commission Regulation (EC) No 1450/2004 of 13 August 2004 implementing Decision No 1608/2003/EC of the European Parliament and of the Council concerning the production and development of Community statistics on innovation[3].

Regulation No 753/2004 covers R&D statistics, statistics on human resources in science and technology ("HRST statistics"), statistics on high-technology industries and knowledge-based services, patent statistics and other STI statistics. The precise data required are listed for R&D statistics only. Regulation No 1450/2004 covers Community innovation statistics only.

Under these two Regulations the main achievements in the various domains of STI statistics have been:

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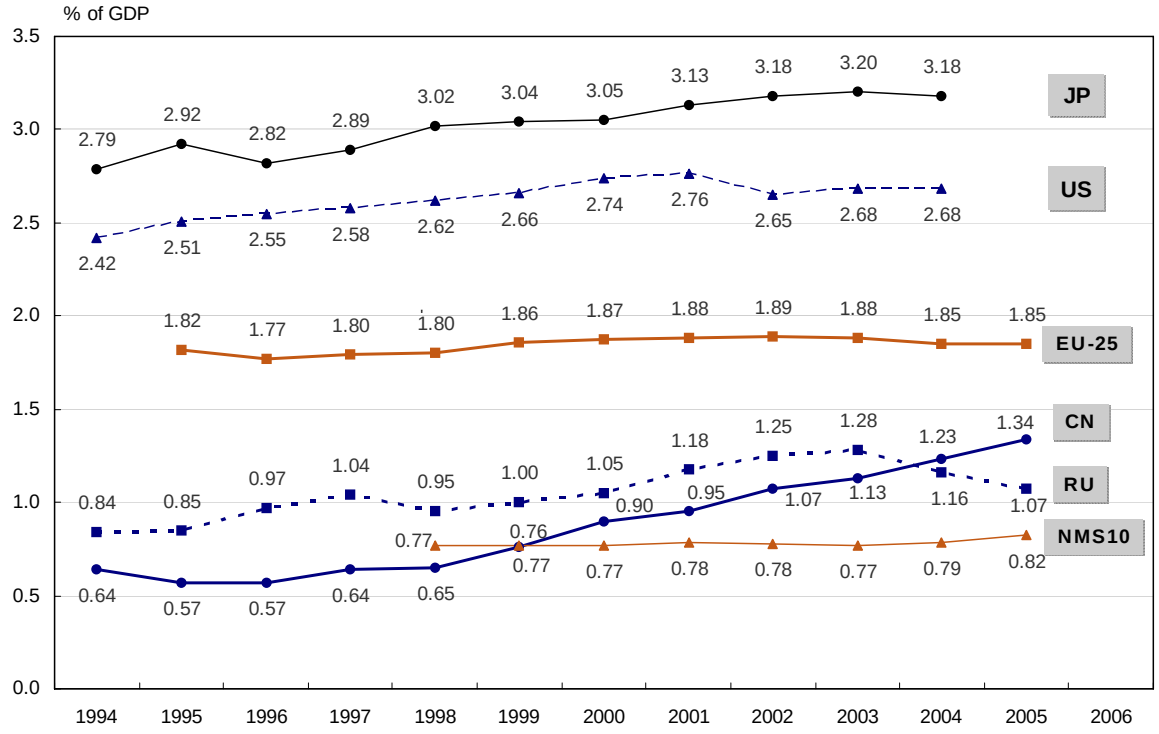
1 OJ L 230, 16.9.2003, p.1
2 OJ L 118, 23.4.2004, p.23
3 OJ L 267, 14.8.2004, p.32

2.1.1 R & D statistics (including Statistics on Government budget appropriations or outlays allocated to R&D, Gbaord statistics)

R&D statistics measure the R&D performance in Europe. The R&D expenditure and the R&D personnel from the point of view of the R&D performing enterprise or institution are compiled in various dimensions and breakdowns. These statistics are based on the so-called Frascati Manual and used for compiling the 3 % Lisbon and Barcelona Council Indicator on R&D intensity.

Figure 1: R&D intensity (R&D expenditure as % of GDP), EU-25, 10 New Member States (NMS 10), China, Japan, Russia and the United States 1994 to 2005



NOTES

Eurostat estimations: EU-25 and NMS10
Provisional data: US 2003 and 2004
US 1993 - 2004: Excludes most or all capital expenditure
JP 1994-1995: Overestimated data
CN 1994-1999: underestimated data
Break in series: JP 1996, US 1998, CN 2000

Source: Eurostat/R&D statistics -OECD - MSTI 2006/1

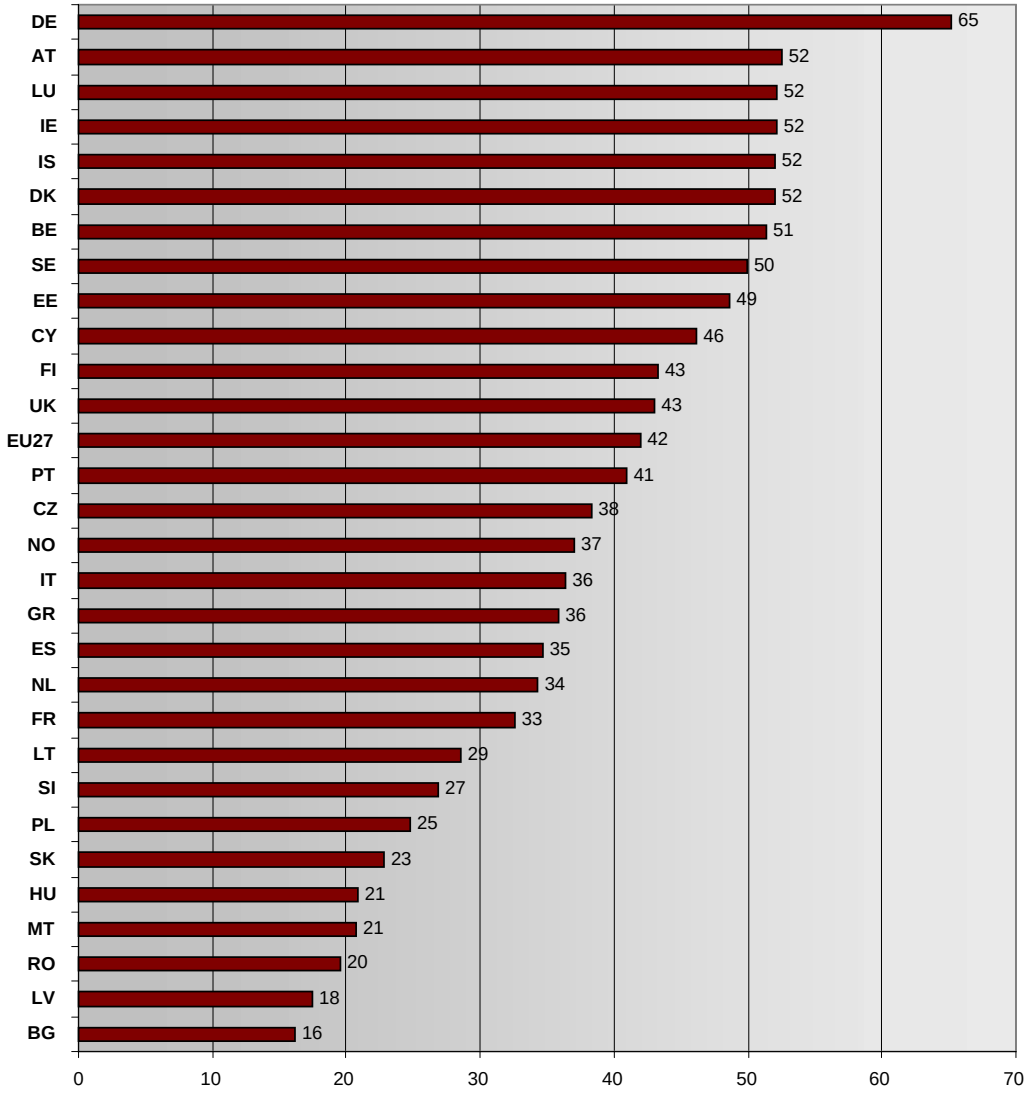
Main achievements:

- Reorganisation and increase of data production and data quality
- Harmonisation of the data collection questionnaire and time series with the OECD
- Establishment and implementation of quality reports on R&D statistics for various institutional sectors.

2.1.2. Community innovation statistics

The Community innovation surveys measure the innovation performance of enterprises in Europe. They provide indicators on innovation activities, the various types of innovation, innovation expenditure, effects or co-operation on innovation. These surveys are the only harmonised source for measuring innovation in Europe and beyond. They are based on the so-called Oslo Manual.

Figure 2: Enterprises with innovation activity, as % of all enterprises, 2002-2004



Source: Eurostat: Community Innovation statistics 2004

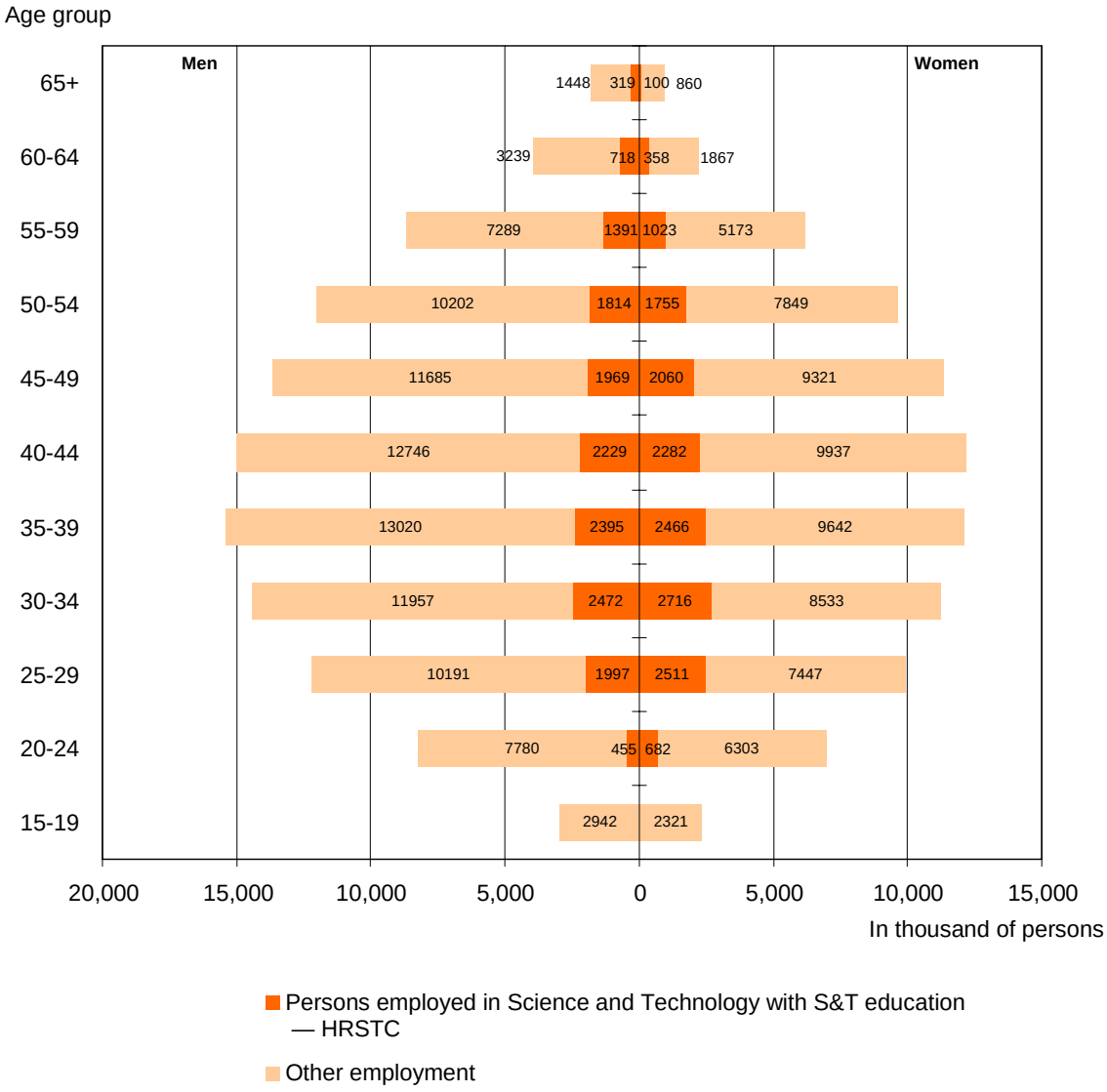
Main achievements:

- Preparation of the fourth Community Innovation Survey with a harmonised survey questionnaire and methodology, broadly implemented in the countries concerned.
- Collection and dissemination of tabulated CIS 4 data and indicators in late 2006, together with the CIS 4 quality reports.
- Release of the 2005 Eurostat/OECD Oslo Manual 2005 which also covers organisational and marketing innovation.
- Preparation of the CIS 2006, based on the reference year 2006, which repeats CIS 4 in many Member States and preparation and implementation of pilot modules on organisational and marketing innovation with a view to CIS 2008.
- Opening of access to the CIS micro-data to more than 50 research institutes so far.

2.1.3 Statistics on human resources in science and technology ("HRST statistics")

The HRST statistics measure the part of the workforce which have a third level education in science and technology or which are employed in a science and technology occupation. Many different dimensions of this part of the workforce are monitored (such as their sector of employment, their age or their national and international mobility). These statistics are based on the so-called Canberra Manual.

Figure 3: Age pyramid of the persons employed in Science and Technology (S&T) with S&T education and of total employment in EU-25, 2004



Source: Eurostat: HRST statistics

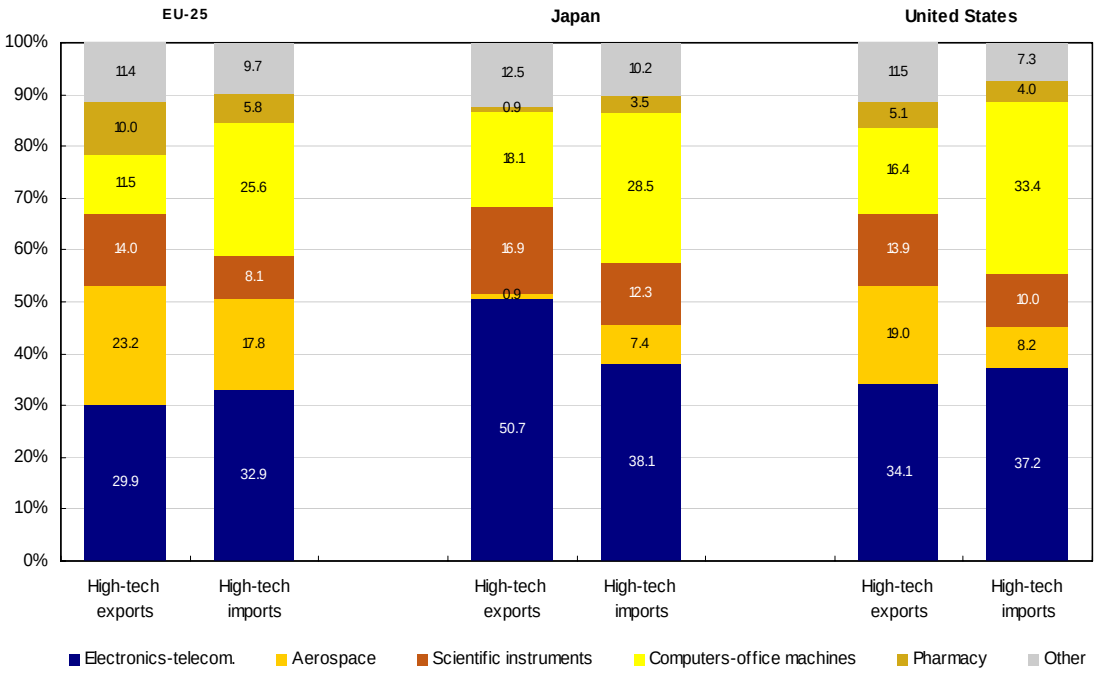
Main achievements:

- Continuation of regular production of HRST statistics based on the micro-data from the Community Labour Force Survey (CLFS) and expansion to allow better measurement of mobility issues.
- Together with the OECD and the UNESCO Institute for Statistics (UIS) and based on strong user needs, preparation and broader implementation of the "statistics on the careers of doctorate holders" ("CDH statistics") monitoring resident doctorate-holders, including their personal characteristics, educational and work history, international mobility, etc.

2.1.4 Statistics on high-technology industries and knowledge-based services ("High-tech statistics")

The high-tech statistics monitor the sectors of the economy which are characterised by high knowledge intensity (e.g. pharmaceuticals, computers, telecommunication, aircraft, R&D). Economic, employment or high tech trade indicators are produced for these industries.

Figure 4: Distribution of high-tech exports and imports by group of products, EU-25, Japan and the United States – 2004



Source: Eurostat: High tech statistics

Main achievements:

- Continuation and stepping-up of regular production of the high-tech statistics based on both official and unofficial sources.
- Assessment of the underlying classifications (including on high tech trade) with a view to the forthcoming revision, related to the revision of the Nace nomenclature of economic activities.

2.1.5 *Patent statistics*

Patent statistics are in general used as output indicators related to science, technology and innovation. The indicators are produced on the base of administrative data coming from the European Patent Office or other patent offices. World-wide comparisons of the patenting activities allow an assessment of the innovative capacity of the respective economies.

Table 1: High-technology patent applications to the EPO by high-tech group, EU-27, Japan and United States — 2003

	EU-27	JP	US
Aviation	256	18	153
Computer and automated business equipment	3,242	2,088	5,479
Communication technology	4,932	2,583	4,475
Lasers	118	90	158
Micro-organism and genetic engineering	1,349	704	2,060
Semi-conductors	943	1,351	1,520
Total high-tech patent applications	**10,840**	**6,834**	**13,845**

Source: Eurostat: Patent statistics

Main achievements:

- Together with other international institutions (such as the European Patent Office, EPO, the US Patent and Trademark Office, USPTO or the OECD), establishment and further improvement of PATSTAT, the harmonised raw data base covering, inter alia, EPO patent applications and USPTO patents granted.
- Production of an automated method for largely harmonising the names of the patent applicants. The application of this method allows the production of additional patent statistics, e.g. patent concentration ratios.
- Increasing use of PATSTAT with production of more user-relevant patent statistics and indicators.

2.1.6 *Production and dissemination*

For further improving the data quality of STI statistics and for establishing longer time series, Eurostat has built-up an in-house production database (STI DB) and started to produce a generic IT application for processing micro-data. Numerous publications have been produced, using the STI statistics disseminated free of charge on the web. Examples include the series of Eurostat Panoramas on science, technology and innovation published annually basis or the around 15 or so issues of Statistics in Focus released regularly. The STI statistics have also been used in numerous policy papers and communications. Prominent examples are the annual European innovation scoreboard produced by DG ENTR or the key figures published by DG RTD.

2.1.7 STI statistics not yet implemented

Due to human resource constraints, other areas mentioned in section 3 of the annex to the Regulation No. 753/2004 have however not been followed-up intensively, e.g. statistics on biotechnology, nanotechnology and on the technological balance of payments.

These lacking actions are however counterbalanced by a number of actions which have been carried forward due to policy needs. Some of these such as the CDH statistics are listed in the previous paragraphs. Others need to be pursued further and are therefore part of chapter 5 (e.g. the better measurement of the internationalisation of R&D).

2.2. Implementation of STI statistics in Member States

This section briefly describes the measures taken in Member States on STI statistics collected directly from them: R&D/Gbaord statistics, Community innovation statistics and CDH statistics. For the other domains, other official or unofficial data sources are used which are not included in surveys to be carried out by Member States.

R&D/Gbaord Statistics

To meet the requirements of Regulation No. 753/2004, many countries adapted their national questionnaires and data collection from 2002/2003 onwards. Often the revised national questionnaires already included the R&D data submitted voluntarily. Generally, the national data compilation methods, often soundly based on surveying known R&D performers, have remained unchanged. Instead, the size of the national R&D survey questionnaires or the use of national data sources has had to be adapted.

A number of countries had problems with transmission of R&D and Gbaord data for the first two obligatory reference years (2003 and 2004), in particular with the completeness of the data and with meeting the deadlines imposed by the Commission Regulation. However, they should have fewer difficulties with R&D statistics for the reference year 2005 in also further improving the timeliness of these statistics. The transmission of the R&D variables requested on a voluntary basis remains incomplete however.

Community innovation statistics

The fourth Community Innovation Survey (CIS 4) was perceived as less burdensome and easier to implement at national level. Member States mostly followed the harmonised CIS 4 survey questionnaire and the harmonised survey methodology. This led to an improvement in data quality, in particular with regard to data comparability and timeliness. The tabulated (regional and national) data were generally transmitted on time. However, Eurostat will not receive all the national CIS 4 micro-data sets as some countries will not transmit these data voluntarily. Furthermore a number of countries will not transmit regional data.

Statistics on the career development of doctorate holders ("CDH statistics")

Based on strong user needs, the broader production of CDH statistics started in 2006 and 2007 in more than 20 Member States. In this context, countries started to work on using national administrative data sources and registers, building-up national sample frames covering all resident doctorate-holders, calculating sample size, drawing-up the national survey questionnaires and developing data collection

techniques. A broader evaluation of the production of CDH statistics at national level will be conducted in 2008.

The European Commission (Eurostat) considers that:

- **considerable progress has been made with the implementation of Decision No 1608/2003/EC, with Regulations No 753/2004 and 1450/2004 covering all the domains of STI statistics;**
- **the launching of additional projects such as the CDH statistics was justified by their relevance with regard to strength of the underlying policy needs,**
- **these measures at international level have generally been observed by the individual countries, which have stepped up their efforts to make the necessary national adaptations or investment. This led to an increase of the available STI statistics e.g. in R&D and Gbaord statistics by around one third since 2001.**

3. STI STATISTICS: DATA QUALITY

The framework for the data quality of STI statistics is the European Statistics Code of Practice4 covering 15 main principles. The main principles relevant for data quality in STI statistics are:

- Principle 3: The adequacy of resources available to national statistical authorities
- Principle 4: Quality commitment for all ESS members
- Principle 7: The soundness of the methodology which must underpin the quality statistics.
- Principle 9: The non-excessive burden on respondents
- and the Principles 11 to 15 related to relevance, accuracy, reliability, timeliness, punctuality, coherence and comparability of the statistics produced.

Data quality as well as cost and burden on respondents are also part of the "Commission Communication on reduction of the response burden, simplification and priority-setting in the field of Community statistics"5. This Communication deals - inter alia - with the re-engineering of business statistics which will also affect STI statistics in the medium term.

Some of the statistical quality issues arising in the various domains are highlighted below. Many of these findings often are taken from the quality reports on the individual surveys:

- **R&D statistics**: The quality of the European R&D statistics improved with implementation of Regulation No 753/2004. An increase in data availability was observed from reference year 2003 onwards. The accuracy of the data and comparability between countries are also good. The recommendations on data compilation made in the OECD Frascati Manual have generally been observed.
- **Community innovation statistics**: The quality for the CIS 4 data also improved considerably compared with previous CIS. Often this is due to the shorter, clearer

4 COM (2005) 217
5 COM (2006) 693

questionnaire, stronger production and implementation process at national level and greater familiarity with the CIS on the part of respondents. The timeliness, completeness and comparability of the national CIS 4 data sets have also improved. The accuracy of the data has been satisfactory for most countries.

- **Other STI statistics**: For the other domains the quality improvements often depend on the progress made with the source data. Considerable progress has been made in this respect with the data from the Community Labour Force Survey or from PATSTAT.

Turning to the Regulations No 753/2004 and No 1450/2004, Eurostat started the compliance monitoring with the legislation on R&D statistics and Community innovation statistics in 2006/2007. This monitoring will be repeated at regular intervals following predefined order of priority for action vis-à-vis Member States.

The European Commission (Eurostat):

- **considers that the quality of R&D statistics and of Community innovation statistics has improved considerably in recent years, inter alia due to Regulations No 753/2004 and 1450/2004;**
- **believes that further improvements in data quality are, however, necessary in the years ahead;**
- **intends to monitor statistical data quality in the various domains in the future too.**

4. STI STATISTICS: COSTS AND BURDEN

Eurostat measures the costs and burden imposed by business statistics in a number of statistical domains. In the case of STI statistics the costs and burden have been measured only for R&D statistics and Community innovation statistics as these have been the only two self-standing surveys of enterprises until now.

Hampered by the fact that not every country replied and that the data received are heterogeneous and not fully comparable, no firm overall conclusions can be drawn on the costs and burden imposed by R&D statistics and the CIS. The example of two countries is however given:

- In **Estonia** an enterprise being surveyed on R&D statistics spends on average 4 hours in compiling all the R&D data required. Due to a low sample rate this time is reduced to 8 minutes only when all enterprises in the countries are taken into consideration. For the Community innovation statistics this burden is 95 minutes for the surveyed enterprise and 55 minutes for all enterprises.
- In **Italy** on the other hand the compilation of the required R&D statistics caused an average burden of 95 minutes at the surveyed enterprises and 40 minutes when all national enterprises are taken into consideration. Vice versa to Estonia, the corresponding figures for the Community innovation statistics are much higher with around 7 hours for the sampled enterprises and less than 2 hours for all national enterprises.

These two examples show that the costs and burden of R&D statistics and Community Innovation statistics caused at enterprises are very heterogeneous. This is also true for the cost/burden measurement in other areas such as Structural

Business Statistics where rather heterogeneous information from only 16 countries is available at this stage.

Beside further efforts of considerably improving the cost and burden measurement caused by the two STI statistics surveys in question, Eurostat will also make the national data compilation methods used for these two surveys more transparent. This should lead to incentives for improving the national methods and consequently reduce the burden on businesses (e.g. through the lowering of the sample size which seem to be too high in some countries).

Similarly, the burden which CDH statistics will place on Member States will also vary, depending on their existing survey frames or on their existing CDH or other national surveys. These statistics are however not targeted at enterprises as respondents, but at persons.

The European Commission (Eurostat)

- **has undertaken an initial measurement of the costs and statistical burden imposed by R&D statistics and Community innovation statistics;**
- **sees that the costs and burden which these statistics impose on respondents and national authorities are rather varied;**
- **believes that the costs and burden can be reduced in many countries purely by the more sophisticated application of statistical methods without endangering data quality.**

5. FURTHER DEVELOPMENT OF STI STATISTICS

Further development of STI statistics should relate to the whole STI system, i.e. to science input, linkages, output and impact. This chapter looks ahead to the next few years. On the one hand much can be achieved by improving the existing statistics in the short to medium term. On the other hand, new indicators, new data sources and new domains of STI statistics should be sought in a medium to long term approach.

5.1 Improving existing STI statistics

5.1.1 Improving the quality of STI statistics

In close co-operation with Member States, Eurostat needs to ensure full implementation of the legislative framework at national level in order to achieve further improvements in data quality. This includes additional data collections and other activities, which need to be pursued and further improved.

Specific cases are: rebalancing the R&D statistics included in Regulation No 753/2004 (based on an assessment of data quality and user needs); making the breakdown of "R&D funded from abroad" compulsory; improving the quality of R&D statistics with a view to the expected capitalisation of R&D in the European System of Accounts and with the view of better responding to the user needs related to women in science; increasing harmonisation of data compilation methods of R&D statistics or further improving their timeliness with now-casts.

The quality (consistency and relevance) of the STI statistics on researchers needs to be improved. Finally the revised classification of economic activities (Nace Rev. 2) needs to be fully incorporated into STI statistics from 2008 onwards. This should make them more relevant.

5.1.2 Statistics on human resources in science and technology ("HRST statistics")

The OECD Canberra Manual, the basic methodology for HRST statistics, dating back to 1992, needs to be revised. This revision should, in particular, deal with the relevance of the concepts and definitions of HRST, which have been found deficient. The CDH statistics also need to be incorporated into the HRST concepts and definitions. Work on this has started. Close co-operation at international level (in particular with the OECD) has to be sought in this context.

The new statistics on the career development of doctorate holders ("CDH statistics") launched by the OECD, the UIS and Eurostat need to be evaluated and stabilised by producing them on a regular basis. This should be done after the first comprehensive national programme implementing CDH statistics in European countries in 2007. As second stage, full integration into the European Statistical System should be envisaged.

5.1.3 Patent statistics

PATSTAT, the new source of patent raw data, opens up many new possibilities for generating patent indicators going beyond those currently produced. Additional indicators can be compiled relating to national patent applications, cleaned names of applicants, internationalisation of patents or inventors. Examples include patent concentration ratios or indicators measuring the industry-science linkages better. Strong user needs for additional indicators could even lead to adaptation of PATSTAT. The PATSTAT raw data file could be further used for building up linkages to other micro-data sets (such as the EU industrial R&D investment scoreboard). Beyond that, the timeliness of patent statistics needs to be improved and production of regional patent statistics needs to be stabilised.

5.1.4 Statistics on high-tech industries and knowledge-based services ("High-tech statistics")

The aggregated high-tech statistics (including the high-tech trade aggregates) have to be revised as the NACE nomenclature of economic activities is changing to Nace Rev. 2 or as the groupings of products needs to be updated. Also the improvements to the structure of economic activities in Nace Rev. 2 are opening new possibilities for more sophisticated, more relevant aggregates. Co-operation with other international partners is needed in this area.

The European Commission (Eurostat) intends:

- **further to improve the quality of STI statistics together with Member States;**
- **to embark on revision of the concepts and definitions for statistics on human resources in science and technology;**
- **to evaluate and stabilise the statistics on the career development of doctorate holders; to make better use of PATSTAT for internationally comparable patent statistics by also creating new indicators;**
- **to revise the concepts and definitions for high-tech industries and knowledge-based services by making them more relevant.**

5.2 New indicators, new data sources and new domains

New indicators also need to be developed, new data sources need to be opened up, other possibly need to be closed and new domains need to be added in the medium to long term. A number of the main areas for medium and long term planning are touched on below.

5.2.1 Better measurement of internationalisation of STI

Measurement of internationalisation of STI seems insufficient considering the fact that STI is becoming more and more international. There are gaps in the data on, for example, R&D expenditure by EU companies outside their territory of R&D owned by foreign affiliates, mobility of highly skilled human resources or international co-operation on innovation.

Improvements can be made step by step in the various domains concerned (e.g. statistics on R&D and on foreign affiliates' statistics). Close co-operation with the OECD also needs to be sought.

5.2.2 Better Community Innovation Surveys for more users

The 2005 Eurostat/OECD Oslo Manual covering two new types of innovation (in organisation and marketing) needs to be fully implemented in CIS 2008. Beyond this, new user demands will be addressed by the forthcoming Community Innovation Surveys, i.e. CIS 2008 and beyond. These include, in particular, better measurement of eco-innovation and design, recording of user-driven innovation or public procurement and innovation. Further sectors of the economy should be added as well as a full coverage of European regions achieved with the next waves of Community Innovation Surveys. On the other hand, care has to taken that the CIS 2008 questionnaire does not get overloaded with a negative effect on data quality.

5.2.3 Better access to micro-data

More intensive use needs to be made of micro-data by researchers, beyond the standard tabulations and indicators disseminated. Taking the CIS as an example, transmission of micro-data to Eurostat and centralised use of them there by researchers considerably improves the cost–benefit ratio. The micro-data can be used either as anonymised micro-data or as confidential micro-data at the Eurostat Safe Centre. Access to both data sets is governed by Commission Regulation No 831/2002. Central availability of CIS micro-data at Eurostat has to be ensured by means of compulsory data transmission from countries. The procedure for access to the CIS micro-data by researchers needs to be simplified.

In the medium term, the possibility of transmission of other STI micro-data should be investigated. The first candidates for this would be the R&D and CDH statistics. This would however require greater harmonisation of data production at national level and sufficient user needs for these micro-data on the art of researchers. Finally, linking different STI micro-data sets with other micro-data sets should be part of a longer term work plan.

5.2.4 More indicators on knowledge flows, linkages, STI output and impact

There is a need to review existing indicators on knowledge transfer between universities and industry to assess their scope (e.g. licensing and patenting, spin-off creation, collaborative research, publications, human resources mobility) and determine their link with economic impact, in view of promoting more coherent data

relevant for knowledge transfer analysis across Europe and defining a set of harmonised indicators. In particular, the need to create new indicators illustrating the knowledge creation and dissemination process within the R&D and innovation systems should be assessed. Such linkage indicators would focus, for example, on networks of researchers/inventors or the extent to which the industrial base makes use of the results of the scientific work for its innovative activities. A specific chapter on innovation linkages was inserted in the 2005 Oslo Manual. Similar to the linkages indicators, the STI output and impact indicators have also not yet been investigated comprehensively. Many improvements are being made (e.g. on patent or bibliometric statistics), but no overall mapping of user needs against the data produced in these areas has yet been carried out. This is particularly true for STI indicators measuring the economic impact, for which no harmonised set of indicators exists.

These requirements apply to all domains of STI statistics (R&D statistics, innovation statistics, HRST statistics, high-tech statistics and patent statistics). First, users needs should be clarified and consolidated in relation with the statistical production possibilities. The existing data production then needs to be improved, mainly by defining and producing new indicators. Better use of the micro-data in the CIS is one immediate candidate for this. On the other hand, immediate incorporation of domains not yet part of the European Statistical System such as bibiliometric statistics, seems difficult, if not impossible. This is mainly due to the lacking resources at Eurostat or the underlying intellectual property rights. Further research and consolidation measures should be launched on this activity.

5.2.5 Screening and re-assessment of STI input indicators

The traditional R& D statistics and the various breakdowns, subdivisions and allocations to the performing sectors (Business enterprise sector, BES, government sector, GOV, Higher Education sector, HES and Private Non-Profit sector, PNP) have existed for over 40 years. They are based on the Frascati Manual (latest version from 2002). They have been adapted over the years without fundamentally changing the concepts and definitions. Moreover, over the years the R&D and Gbaord statistics have been burdened with requests for additional data for which they were not originally designed. New requirements are already looming, e.g. in the form of capitalisation of R&D within the revised System of National Accounts or better measurement of internationalisation of R&D. Also the relevance of some of the R&D and Gboard data produced since many years might be endangered. One example is the Gbaord statistics which do not include data on tax credits.

In the medium term it therefore seems necessary to screen and assess the traditional R&D and Gbaord statistics, particularly their relevance. This should be done not only within the statistical community, but also together with the user and also research community.

5.2.6 Data on individual enterprises, enterprise groups and research or higher education institutions

Efforts have been made at European level to produce and open up access to data on individual enterprises, enterprise groups, and research or educational institutions, such as universities. The information produced has generally been based on information publicly available, e.g. released in the accounts of the relevant entities or being accessible as administrative data at national level. The most prominent example of these efforts is the EU's industrial R&D investment scoreboard, produced by the European Commission (by the IPTS on behalf of DG RTD).

Information on individual enterprises or institutions is added to the aggregated statistics produced as standard output.

Based on such existing activities, a number of measures could be envisaged in the years ahead:

- In the short to medium term the further development of the EU's industrial R&D investment scoreboard could be envisaged in adding more individual data records (e.g. on patents) to it or in starting to seek synergies with the Eurostat Euro-group business register covering enterprise groups and their structures. One aim would be to provide data about the access to finance for innovative enterprises. However, no double data production on single enterprise group data should take place in the long term.
- Similar information on individual institutions (other than enterprises) could also be collected by Eurostat in due course. The first candidates would be European universities with their twin functions of research and education. Indicators on individual universities could be compiled from statistical or administrative data sources at national level and then transmitted to Eurostat. Several research activities are already in progress in this field. As user needs related to this area are growing fast, Eurostat will investigate the feasibility of such a data production and follow-up this work in due course.

5.2.7 Integrating statistics on biotechnology and nanotechnology and other emerging fields.

Development of biotechnology and nanotechnology statistics has been pushed forward mainly by the OECD in recent years. In particular, the work on biotechnology statistics has made progress towards greater harmonisation of the underlying concepts and definitions and on pilot data collections. The work on measuring nanotechnology is not as advanced as the work on biotechnology. However, users (DG RTD) repeatedly expressed information needs in this area.

Biotechnology and nanotechnology statistics should somehow be incorporated into STI statistics in the medium term. This implies, for example, improving R&D statistics, patent statistics or HRST statistics. On the other hand, the statistics on biotechnology and nanotechnology have to be seen broader as broader than just being part of STI statistics. Therefore, in due course, other official or un-official data should also be used to provide additional information needed on biotechnology and nanotechnology. The statistics and data for nanotechnology should whenever possible also provide distinct data and statistics on environment, safety and health impacts of nanotechnologies and related research expenditure

Policy needs for data on Science, technology and innovation do evolve, sometimes in a fast way. Whilst statistical infrastructures can not be adapted at short term notice, they have nevertheless to address new issues. In that respect, the relevance of the classifications and methods used is to be regularly evaluated in view of improvement. The strong policy concerns about environment, public health, climate change and energy production for instance are also linked to further Research and Development in these fields. Whilst currently rather well adapted to produce statistics on these topics, the existing nomenclatures should nevertheless continue to improve their relevance for policy concerns.

The European Commission (Eurostat) intends:

- **to improve measurement of internationalisation of STI;**
- **to improve the Community Innovation Surveys to make them even more relevant;**
- **to improve access to STI micro-data by making transmission of the CIS micro-data to Eurostat also compulsory;**
- **to improve the STI indicators on knowledge flows, linkages, STI output and impact;**
- **to screen the STI input indicators to check their relevance;**
- **to investigate further the handling of STI data related to individual higher education institutions or enterprise groups and to take the appropriate actions in due course;**
- **to integrate statistics on biotechnology , nanotechnology and other emerging fields into STI statistics as far as possible and necessary.**

5.3 Updating the legal framework for STI statistics

The legal framework for STI statistics needs to be upgraded in the medium term. Eurostat aims to take the following actions in this respect:

- Regulation No 753/2004 needs to be rebalanced, taking into consideration additional data needs, integrating some of the data collected on a voluntary basis, eliminating other data of lower relevance or reconsidering the frequencies of data production;
- Regulation No 1450/2004 also needs to be revised basing it on the harmonised survey questionnaire and survey methodology for CIS 2008 and in making transmission of the CIS micro-data compulsory;
- a third Commission Regulation on statistics on the career development of doctorate holders ("CDH statistics") should to be adopted at the appropriate time. Data production every two years could be envisaged.

Additional legislation might become necessary, e.g. on micro-data access and micro-data linking. Eurostat intends to take the appropriate actions in this respect.

The European Commission (Eurostat) intends:

- **to revise Regulations No 753/2004 and 1450/2004 to ensure greater relevance;**
- **to adopt a third Commission Regulation on the statistics on the career development of doctorate holders in due course.**