

International training workshop R&D and Innovation Statistics

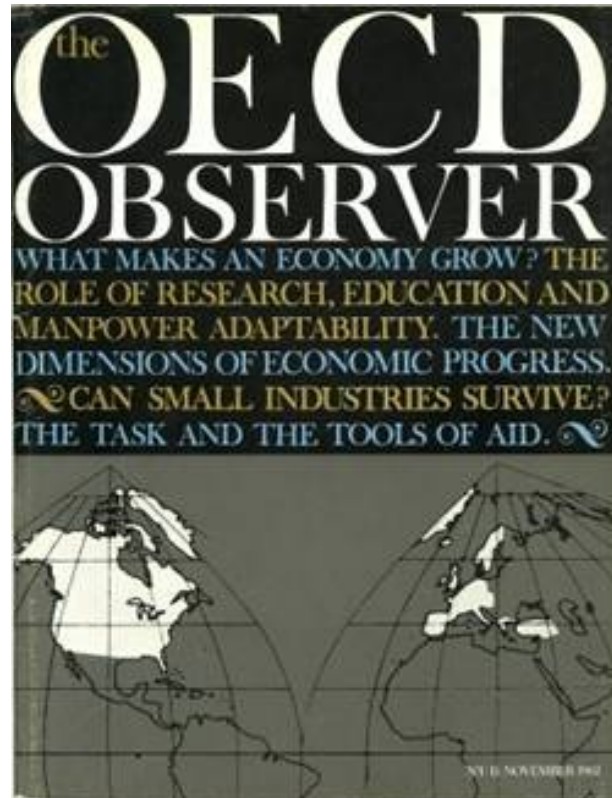
Moscow, 23-24 May 2011

Laudeline Auriol, OECD

Presentation outline

- Historical perspective
- Organisation and coverage of OECD work on S&T statistics
- Frascati manual and related developments
- Human resources in science and technology (Canberra manual and Careers of Doctorate Holders)

The OECD is celebrating its 50th anniversary!



More than 50 years of history in S&T statistics!

Late 1950s → ad-hoc expert group to study surveys of research and development expenditure

1961 → birth of the OECD Directorate of Scientific Affairs

1962 → creation of Unit of R&D measurement

1963 → Frascati conference: 1st edition of Frascati Manual (FM)

1964 → 1st international data collection



THE RESEARCH AND DEVELOPMENT EFFORT

IN WESTERN EUROPE, NORTH AMERICA AND THE SOVIET UNION

an experimental international comparison of research expenditures and manpower in 1962

C. FREEMAN and A. YOUNG

R. W. DAVIES, G. R. DANKER and R. PAVIDLAS
are responsible for the Appendix on the Soviet Union



ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT
PARIS 1962

Table 3. ESTIMATED MANPOWER
ENGAGED ON RESEARCH AND DEVELOPMENT, 1962

	SCIENTISTS AND ENGINEERS ENGAGED ON R AND D	OTHER PERSONNEL ENGAGED ON R AND D	TOTAL PERSONNEL ENGAGED ON R AND D	TOTAL POPULATION	TOTAL WORKING POPULATION (AGED 15-64)	R AND D PERSONNEL PER 1,000 POPULATION	R AND D PERSONNEL PER 1,000 WORKING POPULATION
	('000's full-time equivalent)	('000's)	('000's)	(Millions)	(Millions)		
United States ...	435.6	723.9	1,159.5	186.6	111.2	6.2	10.4
Western Europe*	147.5	370.8	518.3	176.1	113.9	2.9	4.6
Belgium	8.1	12.9	21.0	9.2	6.0	2.3	3.5
France	28.0	83.2	111.2	47.0	29.1	2.4	3.8
Germany	40.1	102.1	142.2	54.7	36.7	2.6	3.9
Netherlands	12.6	20.2	32.8	11.8	7.3	2.8	4.5
United Kingdom..	58.7	152.4	211.1	53.4	34.8	4.0	6.1
USSR ¹ ...	416	623	1,039	220	142	4.7	7.3
² ...	(487)	(985)	(1,472)			(6.7)	(10.4)

* Belgium, France, Germany, Netherlands, United Kingdom.

1. "Conservative" estimates } See Section III.
2. "Project" assumptions }

Source: See Appendix I.



Mode of operation

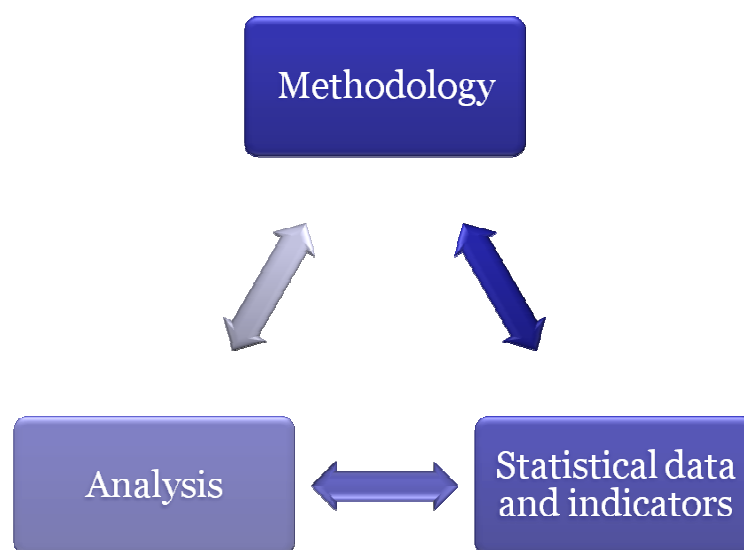
Work is conducted within the
Working Party of National Experts
on Science and Technology
Indicators (NESTI)

NESTI is constituted of both users
and producers of statistics

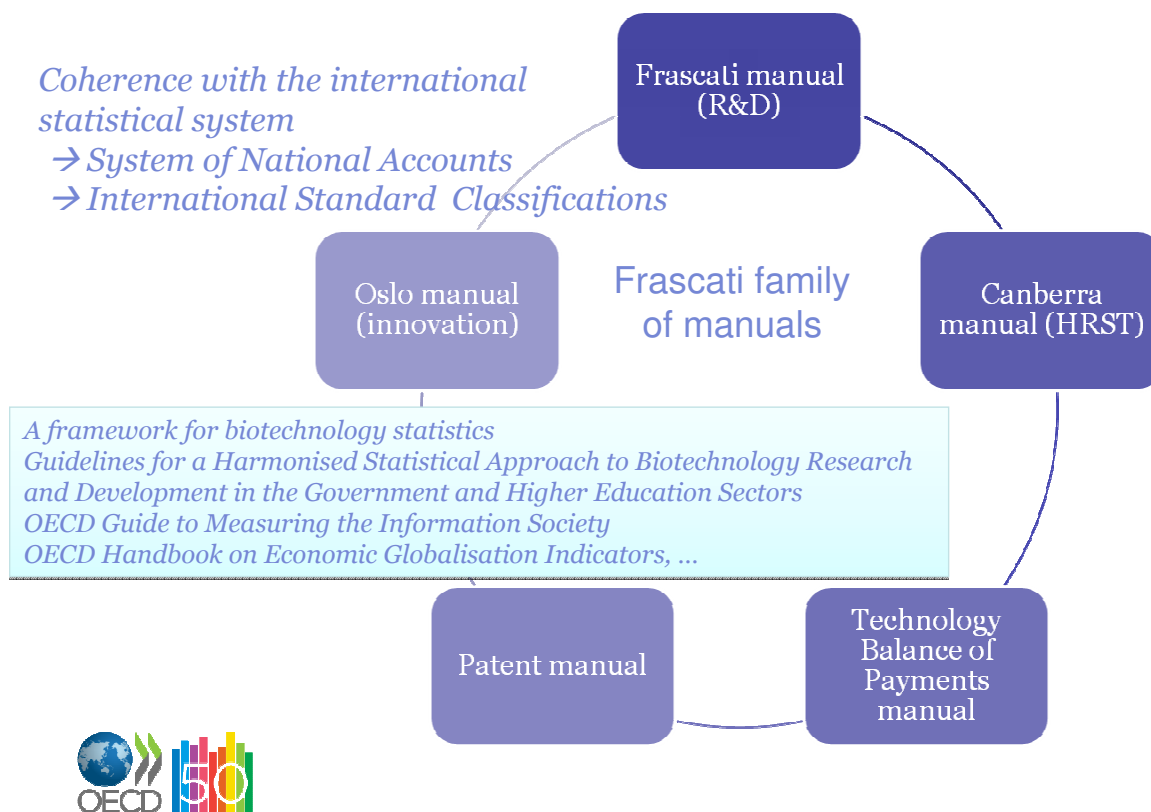
Observers: Brazil, China, Russia
and South Africa

Outreach to India and Indonesia

Close coordination with work of
UIS (UNESCO Institute for
Statistics) and regional bodies (e.g.
Eurostat, RICYT in Latin America)



The Frascati family of manuals and the international statistical system



Previous versions of the Frascati Manual

- Late 1950s: ad-hoc expert group to study surveys of research and development expenditure
- 1963: Frascati conference: 1st edition of Frascati Manual (FM)
- 1964: 1st international data collection
- 1970: 2nd edition (compatibility with existing classifications – SNA, ISIC)
- 1976: 3rd edition (include research in social sciences and humanities, “functional” classifications)
- 1981: 4th edition (small revisions) + 1989: supplement on higher education
- 1994: 5th edition (new policy issues and analytical needs)

The current Frascati Manual

- 6th edition (2002) – R&D expenditure and personnel
- Significant changes:
 - R&D in health and new technologies (biotech, ICT, software)
 - R&D in services
 - Basic research
 - Classifications (NABS, ISIC)
 - R&D personnel (headcount + FTE)
 - Sources of funds and extramural R&D
 - BE sector surveys
 - Annexes: HE data, SNA, relation to other S&T data sources, R&D deflators, etc.



Main definitions

- Definition and scope of R&D: “creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications”
- Exclude: education & training, other related S&T activities (*e.g.* testing, general data collecting), other innovation activities (see Oslo Manual), administrative & support activities
- Borderline issues: graduate students, multi-activity units, other industrial activities (design, testing), software, R&D in social sciences and humanities (SSH)



Main concepts

- Sectoring: Government, Business enterprise, Private non-profit, Higher education, Abroad
- Funder/performer
- Intramural/extramural
- Functional distributions: type of R&D, product field, field of science, socio-economic objective
- GBAORD
- FTE/HC



Further developments

- NESTI Task Force on Reviewing Business R&D&I Surveys
 - review of methodologies and design of surveys used to collect business R&D data
 - “thematic” areas: e.g. data needs for the capitalisation of R&D in the National Accounts, and the measurement of R&D internationalisation
- NESTI Task Force on measuring R&D in the higher education sector
 - stocktaking exercise of the different sources of information and methods used
 - identify areas for further development of guidelines
- NESTI Task force on the calculation of R&D FTEs
 - same modus operandi as for HERD TF
 - guidelines for time-use surveys



Other areas of further developments

- More detailed and improved data on GBAORD
 - type of funding: project versus institutional funding;
 - source of funding: national funding international funding;
 - destination of the funding: national versus international performers.
- An annex to the Frascati Manual on measuring R&D in developing countries (in coordination with the UNESCO Institute for Statistics)



OECD databases and publications

- Main Science & Technology Indicators (MSTI): dtb + pub (biannual)
- Research and Development dtb+ annual pub (R&D Statistics)
- Analytical Business Enterprise R&D database (ANBERD): dtb + pub (annual)
- R&D and GBAORD Sources and methods databases:
http://webnet.oecd.org/rd_gbaord_metadata/default.aspx
- Other products: STI Scoreboard (biennial) Compendium of Patent statistics, etc.



A robust R&D statistical system

- Should be:
 - Informative for policy makers and analysts
 - Integrated with the national statistical system (national accounts, business registers)
 - Compatible with the international statistical standards (→ international comparisons)
 - Sufficiently resourced in terms of funding and qualified staff
- This implies a lot of coordination work and networking both at the national and international level



Human resources in science and technology

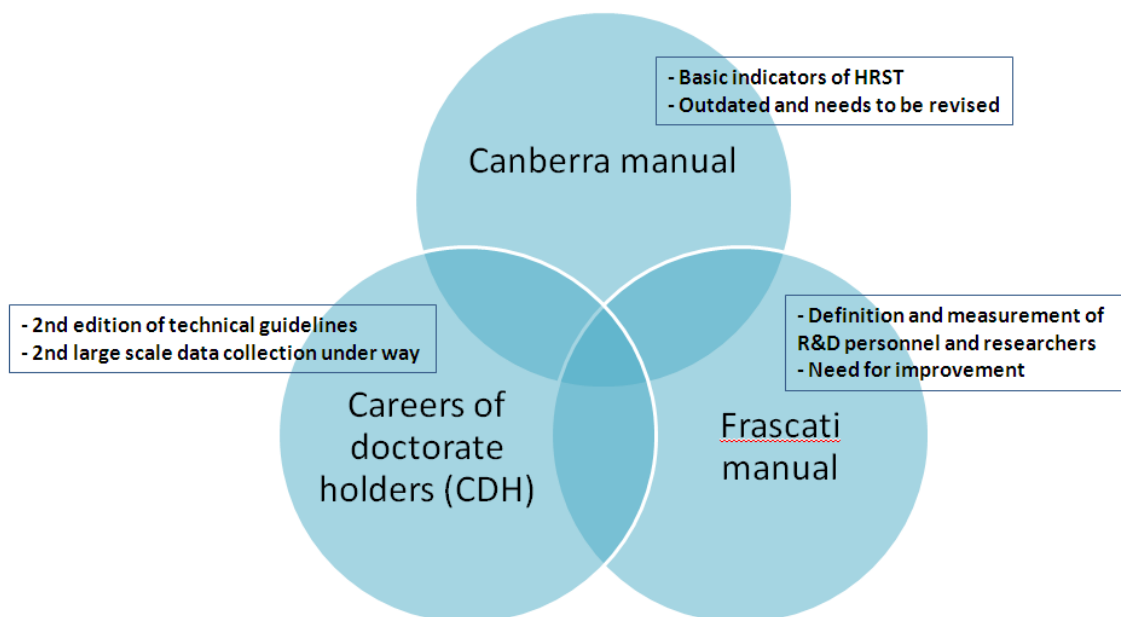
Canberra Manual (1995) and
Careers of Doctorate Holders
(CDH)

Introduction

- Longstanding recognition of :
 - The importance of human capital in the economic activity
 - The important role of highly skilled workers in a knowledge based economy
- The contribution of human resources in science, technology, innovation and R&D is an important component for the measurement framework



HRST measurement framework



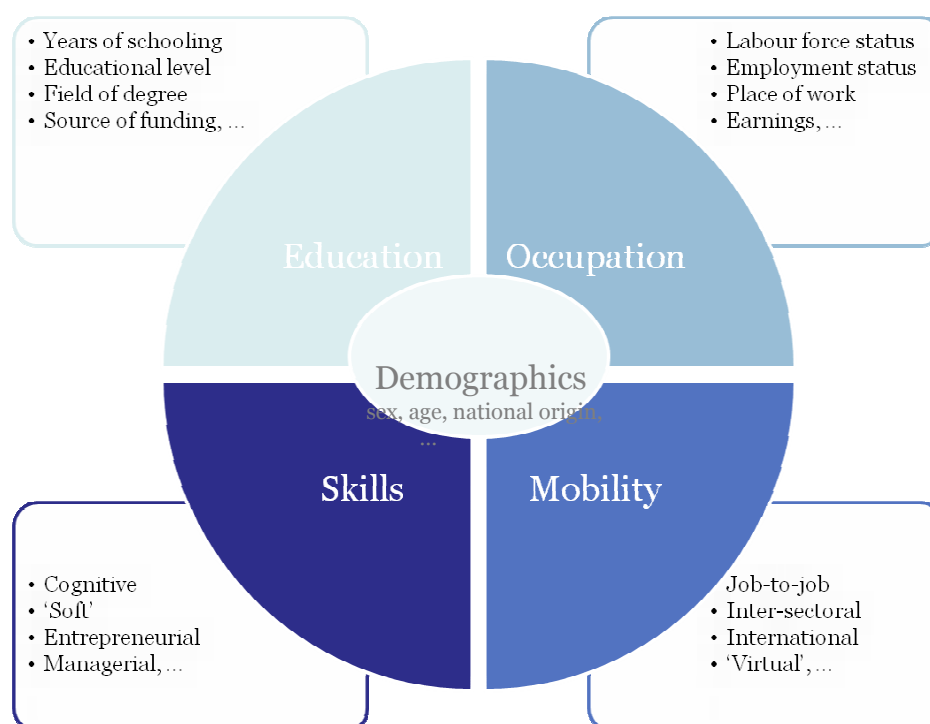
Definition of HRST in the Canberra manual

HRST are people who fulfil one or other of the following conditions:

- a) successfully completed education at the third level in an S&T field of study (ISCED-97 5/6);
- b) not formally qualified as above, but employed in a S&T occupation where the above qualifications are normally required (ISCO-88 1&2&3).



HRST main measurement dimensions



Typical data sources for HRST

- **Education statistics**
- **Labour force surveys**
- **Censuses**
- Population registers
- National administrative systems for regulating and monitoring immigration
- Administrative systems relating to temporary residence or work permits for non-nationals
- Specific surveys



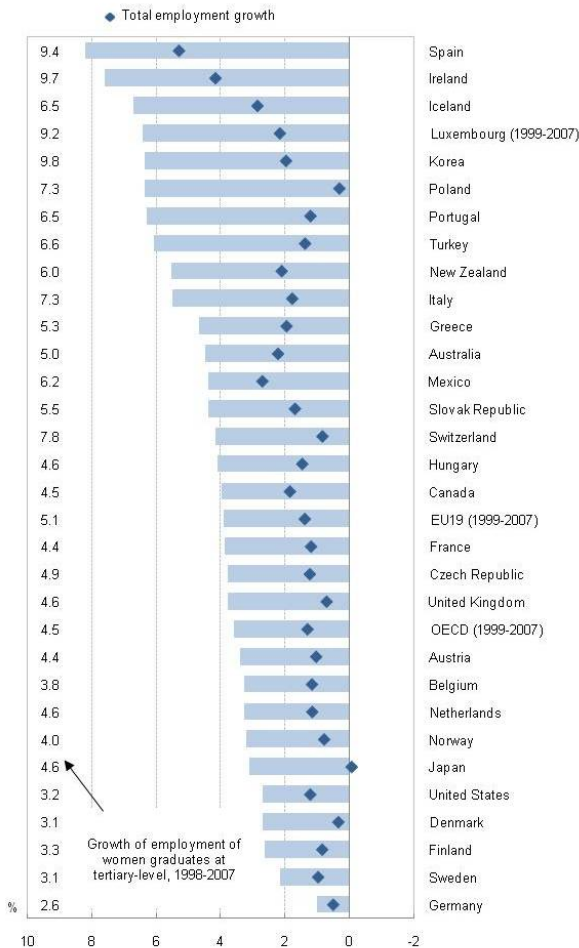
OECD data sources for HRST

- OECD Education database
- OECD Educational attainment database
- Database on immigrants in OECD countries (DIOC)
- OECD ANSKILL database
- OECD/UIS/ Eurostat CDH data collections
- OECD R&D database
- External databases (e.g. NSF, IIE)



Employment growth of tertiary level graduates, 1998-2007

Average annual growth rates



The OECD Educational Attainment Database provides data on population at different levels of education distributed by sex, age and work status (employed, unemployed, inactive). It is compiled from member countries' labour force surveys and/or the European labour force survey. Adjustments are made to ensure comparability across countries, notably concerning national levels of education, which are recoded according to the International Standard Classification of Education (ISCED 1997).

Careers of Doctorate Holders (CDH) project

- Why doctorate holders?
 - they are the most qualified in terms of education level and they are specifically trained for research
 - they play a key role in the creation and dissemination of knowledge and innovation
- Objective: collect data on personal, educational, labour market, employment and mobility characteristics of doctorate holders, as well as their perception and satisfaction with work
- A joint OECD/Eurostat/UNESCO project launched by the OECD Secretariat in 2004

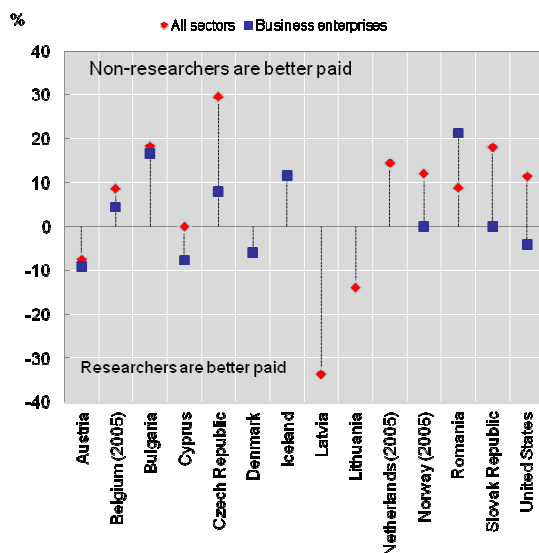
Careers of Doctorate Holders (CDH) project

- An expert group formed of representatives from national statistical bodies (participation on a voluntary basis)
- Technical guidelines: methodological guidelines, model questionnaire and output tables to report data at the international level
 - OECD Working paper DSTI/DOC(2010)1
- First pilot data collection in 2005 (7 countries)
 - OECD Working paper DSTI/DOC(2007)2
- First large scale data collection in 2007 (25 countries) provided a rich set of data
 - OECD Working paper DSTI/DOC(2010)4
- Second large scale data collection in 2010 (25 countries)

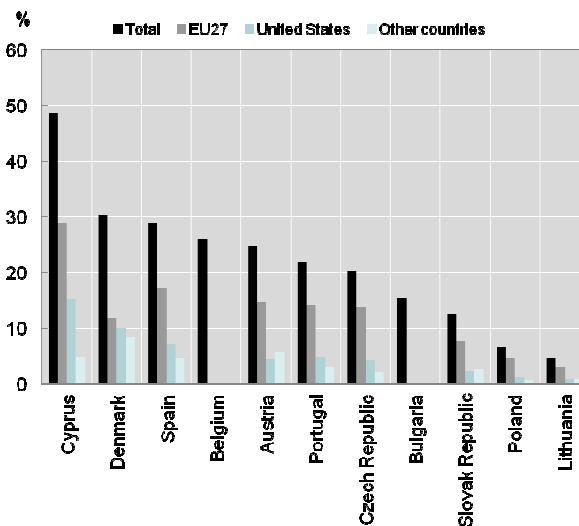



Careers of Doctorate Holders (CDH) project

Percentage difference in median gross annual earnings, 2006



Percentage of national citizens having lived/stayed abroad in the past ten years, 2006





Thank you!
Laudeline.auriol@oecd.org

