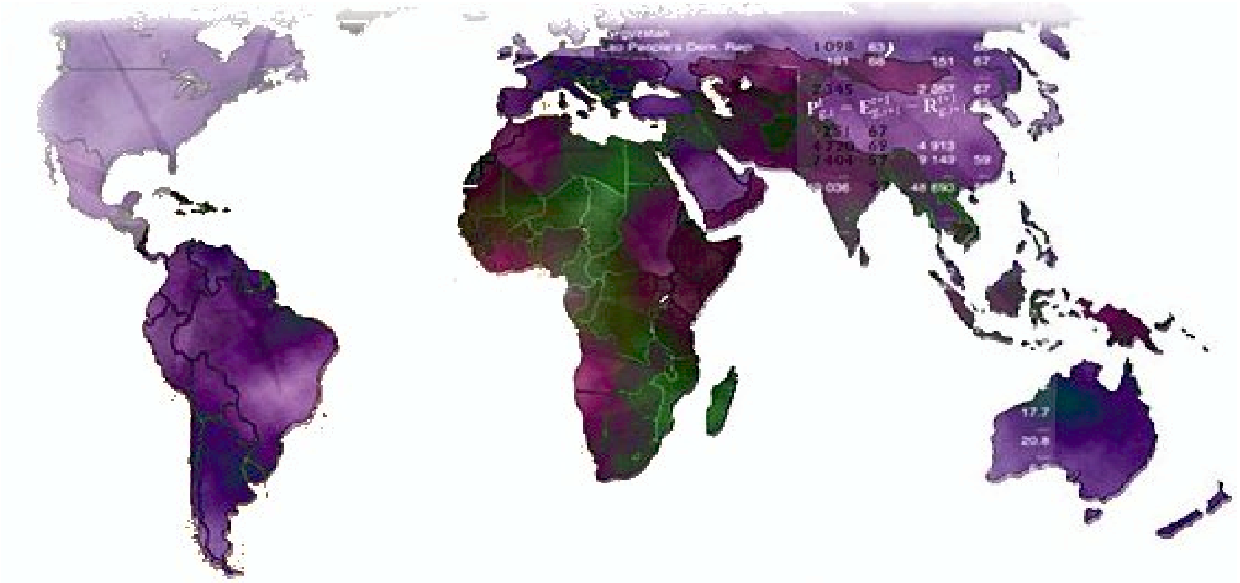


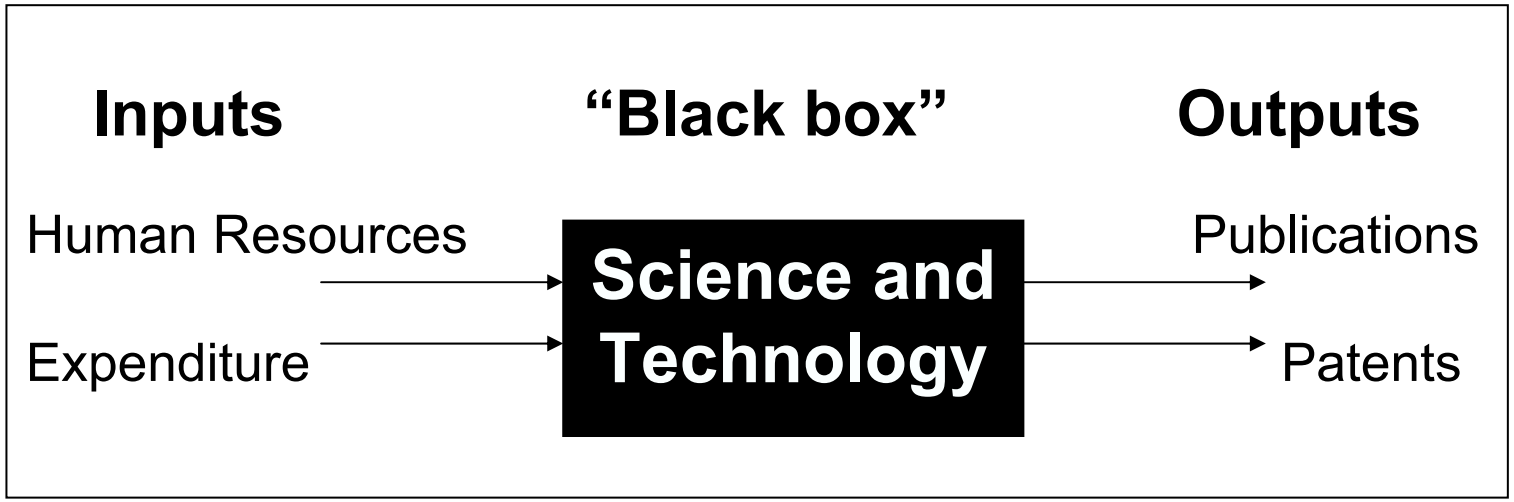
Measuring Research and Experimental Development

WORKSHOP ON
SCIENCE, TECHNOLOGY AND INNOVATION INDICATORS:
TRENDS AND CHALLENGES IN SOUTH EASTERN EUROPE

27-31 March 2007, Skopje.

Types of S&T indicators

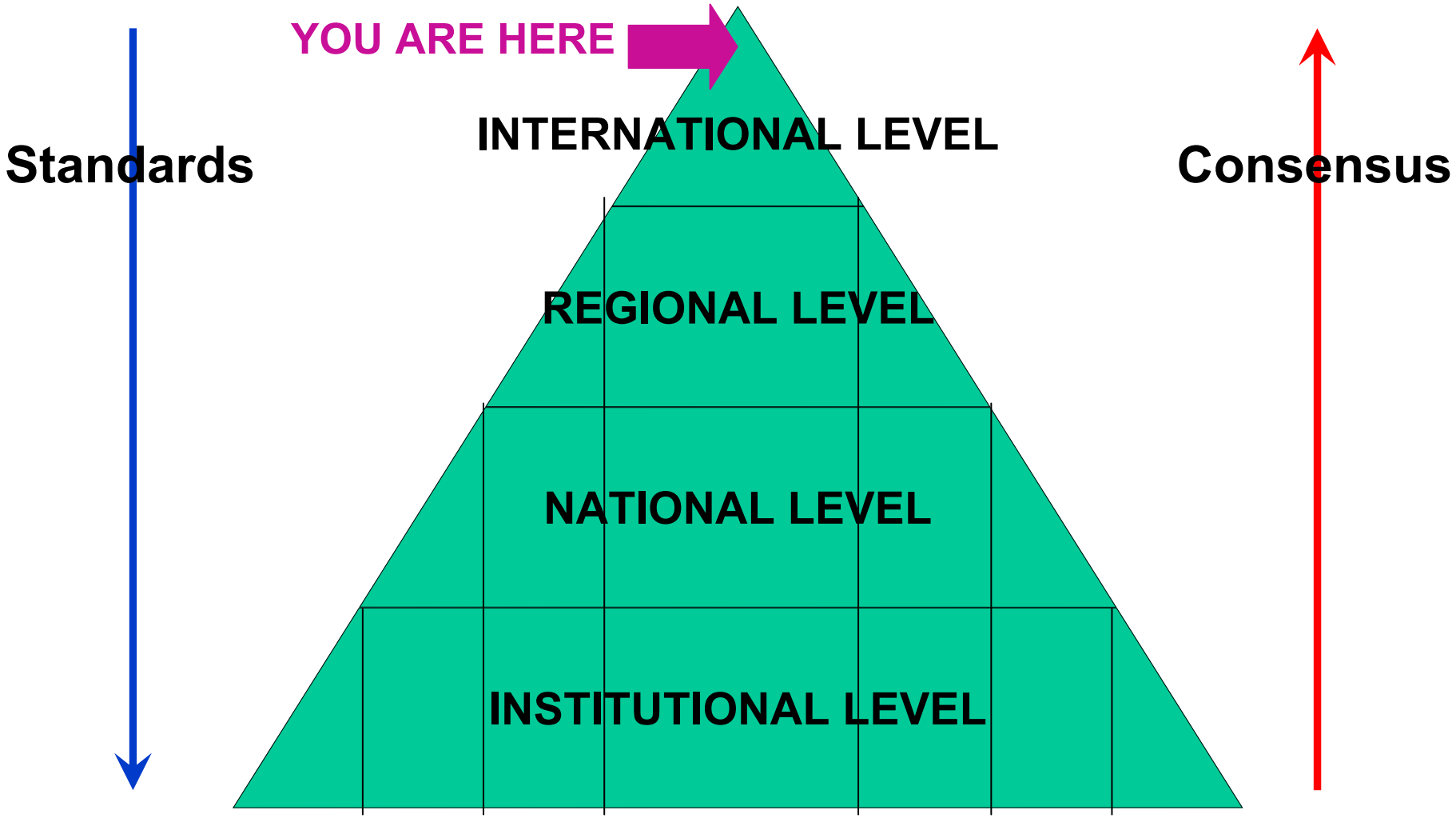
- We cannot measure S&T directly. Therefore we measure proxies:
  - Input indicators
  - Output indicators
  - Impact indicators



What is in the “black box”?

- We need to define clearly WHAT we are measuring.
- Science and Technology?
- Innovation?
- Research and Experimental Development (R&D)?

Chris Freeman's pyramid revisited



"Frascati family" of OECD Manuals

The Measurement of Scientific and Technological Activities

Type of data	Title
R&D	*Frascati Manual: Proposed Standard Practice for Surveys of Research and Experimental Development* (6th Edition, 2002) *R&D Statistics and Output Measurement in the Higher Education Sector. "Frascati Manual Supplement"* (1989)
Technology balance of payments	*"Manual for the Measurement and Interpretation of Technology Balance of Payments Data – TBP Manual"* (1990)
Innovation	*OECD Proposed Guidelines for Collecting and Interpreting Technological Innovation Data – Oslo Manual* (3rd Edition, 2005)
Patents	*"Using Patent Data as Science and Technology Indicators – Patent Manual 1994"*
S&T personnel	*The Measurement of Human Resources Devoted to Science and Technology – Canberra Manual* (1995)

Other relevant OECD frameworks

Type of data	Title
High-technology	"Revision of High-technology Sector and Product Classification" (OECD, STI Working Paper 1997/2)
Bibliometrics	"Bibliometric Indicators and Analysis of Research Systems, Methods and Examples", by Yoshiko Okubo (OECD, STI Working Paper 1997/1)
Globalisation	*Handbook of Economic Globalisation Indicators* (2005)
Information Society	*Guide for Information Society Measurements and Analysis (2005)*
Biotechnology	*Framework for Biotechnology Statistics (2005).*
Productivity	Measuring Productivity. Measurement of aggregate and industry-level productivity growth (2001)

UNESCO methodologies and frameworks

- Recommendation concerning the International Standardization of Statistics on Science and Technology, 1978
- UNESCO Manual for Statistics on Scientific and Technological Activities ST-84/WS/12, Paris, 1984
- International Standard Classification of Education - ISCED 1997

STA: Definition

For statistical purposes,
Scientific and Technological Activities (STA)
can be defined as all systematic activities which are closely concerned with the generation, advancement, dissemination, and application of scientific and technical knowledge in all fields of science and technology, that is the natural sciences, engineering and technology, the medical and the agricultural sciences (NS), as well as the social sciences and humanities (SSH).

R&D: Definition

Research and experimental development (R&D) comprise 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.

Basic research

Basic research

is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view.

Applied research

Applied research

is also original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific practical aim or objective.

Experimental development

Experimental development
is systematic work, drawing on existing knowledge gained from research and/or practical experience, which is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed.

STET: Definition

Scientific and technological education and training at broadly the third level (STET) can be defined as all activities comprising specialized non-university higher education and training, higher education and training leading to a university degree, post-graduate and further training and organized lifelong training for scientists and engineers.

Limits between R&D and teaching and training

- In institutions of higher education, research and teaching are always very closely linked, as most academic staff do both, and many buildings, as well as much equipment, serve both purposes.
- Because the results of research feed into teaching, and because information and experience gained in teaching can often result in an input to research, it is difficult to define where the education and training activities of higher education staff and their students end and R&D activities begin, and *vice versa.* Its elements of novelty distinguish R&D from routine teaching and other work-related activities.

Example: Borderline between R&D and education and training at ISCED level 6

	Education and training at level 6	R&D	Other activities
Teachers	1. Teaching students at level 6. 2. Training students at level 6 in R&D methodology, laboratory work, etc.	3. Supervision of R&D projects required for student qualification at level 6 4. Supervision of other R&D projects and performance of own R&D projects	5. Teaching at levels lower than level 6 6. Other activities
Post-graduate students	1. Course work for formal qualification.	2. Performing and writing up independent studies (R&D projects) required for formal qualification 3. Any other R&D activities	4. Teaching at levels lower than level 6 5. Other activities

STS: Definition

Scientific and technological services (STS) can be defined as any activities concerned with scientific research and experimental development and contributing to the generation, dissemination and application of scientific and technical knowledge.

STS: detailed activities

- S&T services provided by libraries, archives, information and documentation centres, reference departments, scientific congress centres, data banks and information-processing departments.
- S&T services provided by museums of science or technology, botanical and zoological gardens and other S&T collections (anthropological, archaeological, geological, etc.).
- Systematic work on the translation and editing of S&T books and periodicals.
- Topographical, geological and hydrological surveying; meteorological and seismological observations; surveying of soils and of plants; fish and wildlife resources; routine soil, atmosphere and water testing; the routine checking and monitoring of radioactivity levels.
- Prospecting and related activities designed to locate and identify oil and mineral resources.

STS: detailed activities (continued)

- The gathering of information on human, social, economic and cultural phenomena, usually for the purpose of compiling routine statistics, e.g. population censuses; production, distribution and consumption statistics; market studies; social and cultural statistics, etc.
- Testing, standardization, metrology and quality control; regular routine work relating to the analysis, checking and testing, by recognized methods, of materials, products, devices and processes, together with the setting up and maintenance of standards and standards of measurement.
- Regular routine work on the counselling of clients, other sections of an organization or independent users, designed to help them to make use of scientific, technological and management information.
- Activities relating to patents and licences.

Innovation: definition (Oslo Manual 2005)

An

innovation

is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations.

Innovation activities

Innovation activities

are all scientific, technological, organisational, financial and commercial steps which actually, or are intended to, lead to the implementation of innovations. Some innovation activities are themselves innovative, others are not novel activities but are necessary for the implementation of innovations. Innovation activities also include R&D that is not directly related to the development of a specific innovation.

Some cases at the borderline between R&D and other industrial activities

Item	Treatment	Remarks
Prototypes	Include in R&D	As long as the primary objective is to make further improvements.
Pilot plant	Include in R&D	As long as the primary purpose is R&D.
Industrial design and drawing	Divide	Include design required during R&D. Exclude design for production process.
Industrial engineering and tooling up	Divide	Include “feedback” R&D and tooling up industrial engineering associated with development of new products and new processes. Exclude for production processes.
Trial production	Divide	Include if production implies full-scale testing and subsequent further design and engineering. Exclude all other associated activities.
After-sales service & troubleshooting	Exclude	Except “feedback” R&D.

Some cases at the borderline between R&D and other industrial activities (cont.)

Item	Treatment	Remarks
Patent and licence work	Exclude	All administrative and legal work connected with patents and licences (except patent work directly connected with R&D projects).
Routine tests	Exclude	Even if undertaken by R&D staff.
Data collection	Exclude	Except when an integral part of R&D.
Public inspection control, enforcement of standards, regulations	Exclude	

Examples of R&D activities

- In the field of medicine, routine autopsy on the causes of death is the practice of medical care and is not R&D; special investigation of a particular mortality to establish the side effects of certain cancer treatments is R&D. Similarly, routine tests such as blood and bacteriological tests carried out for doctors are not R&D, whereas a special programme of blood tests in connection with the introduction of a new drug is R&D.
- The keeping of daily records of temperatures or of atmospheric pressure is not R&D but the operation of a weather forecasting service or general data collection. The investigation of new methods of measuring temperature is R&D, as are the study and development of new systems and techniques for interpreting the data.

Examples of R&D (contd.)

- R&D activities in the mechanical engineering industry often have a close connection with design and drawing work. In small and medium-size enterprises (SMEs) in this industry, there is usually no special R&D department, and R&D problems are mostly dealt with under the general heading “design and drawing”. If calculations, designs, working drawings and operating instructions are made for the setting up and operating of pilot plants and prototypes, they should be included in R&D. If they are carried out for the preparation, execution and maintenance of production standardisation *(e.g.* jigs, machine tools) or to promote the sale of products *(e.g.* offers, leaflets, catalogues of spare parts), they should be excluded from R&D.

Examples of R&D in software

- R&D producing new theorems and algorithms in the field of theoretical computer science.
- Development of information technology at the level of operating systems, programming languages, data management, communications software and software development tools.
- Development of Internet technology.
- Research into methods of designing, developing, deploying or maintaining software.
- Software development that produces advances in generic approaches for capturing, transmitting, storing, retrieving, manipulating or displaying information.
- Experimental development aimed at filling technology knowledge gaps as necessary to develop a software programme or system.
- R&D on software tools or technologies in specialised areas of computing (image processing, geographic data presentation, character recognition, artificial intelligence and other areas).

This is not to be counted as R&D

- Business application software and information system development using known methods and existing software tools.
- Support for existing systems.
- Converting and/or translating computer languages.
- Adding user functionality to application programmes.
- Debugging of systems.
- Adaptation of existing software.
- Preparation of user documentation.

Criteria for identifying R&D in services

- Links with public research laboratories.
- The involvement of staff with PhDs, or PhD students.
- The publication of research findings in scientific journals, organisation of scientific conferences or involvement in scientific reviews.
- The construction of prototypes or pilot plants.

Examples of R&D in banking and insurance

- Mathematical research relating to financial risk analysis.
- Development of risk models for credit policy.
- Experimental development of new software for home banking.
- Development of techniques for investigating consumer behaviour for the purpose of creating new types of accounts and banking services.
- Research to identify new risks or new characteristics of risk that need to be taken into consideration in insurance contracts.
- Research on social phenomena with an impact on new types of insurance (health, retirement, etc.), such as on insurance cover for non-smokers.
- R&D related to electronic banking and insurance, Internet-related services and e-commerce applications.
- R&D related to new or significantly improved financial services (new concepts for accounts, loans, insurance and saving instruments).

Examples of R&D in other service activities

- Analysis of the effects of economic and social change on consumption and leisure activities.
- Development of new methods for measuring consumer expectations and preferences.
- Development of new survey methods and instruments.
- Development of tracking and tracing procedures (logistics).
- Research into new travel and holiday concepts.
- Launch of prototype and pilot stores.

WHAT DO WE MEASURE: Types of indicators

- **Input indicators:** R&D expenditure and human resources.
- **Output indicators:** publications and patents.
- **Impact indicators:** innovation, social impact (?).
- **Technology transfer indicators:** technology balance of payment.

Frascati Manual deals with “Input indicators”

- **R&D Personnel**: are all persons employed directly on R&D, as well as those providing direct services such as R&D managers, administrators, and clerical staff.
  - Researchers
  - Technicians
  - Other supporting staff
- **R&D Expenditure**

→ Both inputs are necessary to secure an adequate representation of the effort devoted to R&D

Researchers

Researchers

are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of the projects concerned

Researchers (continued)

- Researchers are classified in ISCO-88 Major Group 2, “Professionals”, and in “Research and Development Department Managers” (ISCO-88, 1237). By convention, members of the armed forces with similar skills who perform R&D should also be included.
- Managers and administrators engaged in the planning and management of the scientific and technical aspects of a researcher’s work also fall into this category. Their rank is usually equal or superior to that of persons directly employed as researchers and they are often former or part-time researchers.
- Postgraduate students at the PhD level engaged in R&D should be considered as researchers. They typically hold basic university degrees (ISCED level 5A) and perform research while working towards the PhD (ISCED level 6).

Technicians and equivalent staff

Technicians and equivalent staff
are persons whose main tasks require technical knowledge and experience in one or more fields of engineering, physical and life sciences or social sciences and humanities. They participate in R&D by performing scientific and technical tasks involving the application of concepts and operational methods, normally under the supervision of researchers.
Equivalent staff perform the corresponding R&D tasks under the supervision of researchers in the social sciences and humanities.

Technicians and equivalent staff (contd.)

- Technicians and equivalent staff are classified in ISCO-88 Major Group 3, “Technicians and Associate Professionals”, notably in Sub-major Groups 31, “Physical and Engineering Science Associate Professionals”, and 32, “Life Science and Health Associate Professionals”, and in ISCO-88, 3434, “Statistical, Mathematical and Related Associate Professionals”. Members of the armed forces who work on similar tasks should also be included.
- Their tasks include:
  - Carrying out bibliographic searches and selecting relevant material from archives and libraries.
  - Preparing computer programmes.
  - Carrying out experiments, tests and analyses.
  - Preparing materials and equipment for experiments, tests and analyses.
  - Recording measurements, making calculations and preparing charts and graphs.
  - Carrying out statistical surveys and interviews.

Other supporting staff

Other supporting staff

includes skilled and unskilled craftsmen, secretarial and clerical staff participating in R&D projects or directly associated with such projects.

Other supporting staff (continued)

- Other R&D supporting staff are essentially found in ISCO-88 Major Groups 4, “Clerks”; 6, ”Skilled Agricultural and Fishery Workers”; and 8, ”Plant and Machine Operators and Assemblers”.
- Included under this heading are all managers and administrators dealing mainly with financial and personnel matters and general administration, insofar as their activities are a direct service to R&D. They are mainly found in ISCO-88 Major Group 2, “Professionals”, and Minor Group 343, “Administrative Associate Professionals” (except 3434).

Head Count data

“Head Count (HC)” data
are data on the total number of persons who are mainly or partially employed on R&D.

Headcount data are the most appropriate measure for collecting additional information about R&D personnel, such as age, gender or national origin.

Head Count data

- *Possible approaches and options*
  - Number of persons engaged in R&D at a given date (*e.g.* end of period).
  - Average number of persons engaged in R&D during the (calendar) year.
  - Total number of persons engaged in R&D during the (calendar) year.

Full time equivalent

- Series based on the number of full-time equivalent staff are considered to be a true measure of the volume of R&D.
- R&D may be the primary function of some persons (*e.g.* workers in an R&D laboratory) or it may be a secondary function (*e.g.* members of a design and testing establishment). It may also be a significant part-time activity (*e.g.* university teachers or postgraduate students). To count only persons whose primary function is R&D would result in an underestimate of the effort devoted to R&D; to do a headcount of everyone spending some time on R&D would lead to an overestimate. The number of persons engaged in R&D must, therefore, also be expressed in full-time equivalents on R&D activities.

FTE

- One FTE may be thought of as one person-year. Thus, a person who normally spends 30% of his/her time on R&D and the rest on other activities (such as teaching, university administration and student counselling) should be considered as 0.3 FTE. Similarly, if a full-time R&D worker is employed at an R&D unit for only six months, this results in an FTE of 0.5.

FTE: sources

- Time-use surveys
- Survey: Full-time / part-time
- R&D coefficients

Tables recommended by Frascati Manual

- Total national R&D personnel by sector and by occupation (HC & FTE)
- Total national R&D personnel by sector and by level of qualification (HC & FTE)
- Researchers and, if possible, other categories of R&D personnel (HC), by:
  - Sex
  - Age

R&D expenditure (general issues)

- The basic measure is “intramural expenditures”; *i.e.* all expenditures for R&D performed within a statistical unit or sector of the economy.
- Another measure, “extramural expenditures”, covers payments for R&D performed outside the statistical unit or sector of the economy.
- For R&D purposes, both current costs and capital expenditures are measured.
- In the case of the government sector, expenditures refer to direct rather than indirect expenditures.

R&D expenditure

- Depreciation costs are excluded.
- R&D is an activity involving significant transfers of resources among units, organisations and sectors and especially between government and other performers. It is important for science policy advisors and analysts to know who finances R&D and who performs it.

Measuring R&D expenditure

- A statistical unit may have expenditures on R&D either within the unit (intramural) or outside it (extramural). The full procedure for measuring these expenditures is as follows:
  - Identify the intramural expenditure on R&D performed by each statistical unit.
  - Identify the sources of funds for these intramural R&D expenditures as reported by the performer.
  - Aggregate the data by sectors of performance and sources of funds to derive significant national totals.
  - Optional: Identify the extramural R&D expenditures of each statistical unit.

R&D expenditure

- R&D expenditure refers to resources actually spent in R&D activities, rather than only budgeted. Therefore, the way to obtain sound data is to rely on responses of R&D performers, rather than funding agencies.

R&D expenditure: current costs

- **Current costs** are composed of:
  - ***labour costs of R&D personnel*** (annual wages and salaries and all associated costs or fringe benefits) and
  - ***other current costs*** (non-capital purchases of materials, supplies and equipment to support R&D, including water, gas and electricity; books, journals, reference materials, subscriptions to libraries, scientific societies, etc.; materials for laboratories such as chemicals or animals, costs for on-site consultants, administrative and other overhead costs (*e.g.* office, post and telecommunications, insurance), costs for indirect services (e.g. security; storage; use, repair and maintenance of buildings and equipment; computer services; and printing of R&D reports), labour costs of non-R&D personnel).
- Current costs may be prorated if necessary to allow for non-R&D activities within the same statistical unit.

R&D expenditure: capital expenditure

- **Capital expenditures** are the annual gross expenditures on fixed assets used in the R&D programmes of statistical units, including land and buildings, instruments and equipment, and computer software.
- Expenditure should be reported in full for the period when it took place and should not be registered as an element of depreciation.
- All depreciation provisions for building, plant and equipment, whether real or imputed, should be excluded from the measurement of intramural R&D expenditures.

Sources of R&D expenditure

Criteria for identifying flows of R&D funds

- For such a flow of funds to be correctly identified, two criteria must be fulfilled:
  - There must be a direct transfer of resources.
  - The transfer must be both intended and used for the performance of R&D.

Public general university funds (GUF)

To finance their R&D activities, universities usually draw on three types of funds:

- R&D contracts and earmarked grants received from government and other outside sources. ***These should be credited to their original source.***
- Income from endowments, shareholdings and property, plus surplus from the sale of non-R&D services such as fees from individual students, subscriptions to journals and sale of serum or agricultural produce. ***These are the universities' "own funds".***
- The general grant they receive from the ministry of education or from the corresponding provincial or local authorities in support of their overall research/teaching activities. As government is the original source and has intended at least part of the funds concerned to be devoted to R&D, **the R&D content of these public general university funds should be credited to government as a source of funds,** for the purposes of international comparisons.

GERD - matrix of performing and funding sectors

Funding sectors (Sources of funds)	**Sectors of performance**				Total
	Business enterprise	Government	Private non-profit	Higher education	
Business enterprise					*Total financed by BE sector*
Government					*Total financed by G sector*
Public general university funds (GUF)					*Total financed by GUF*
Higher education					*Total financed by HE sector*
Private non-profit (PNP)					*Total financed by PNP sector*
Funds from Abroad Foreign enterprise (Within same group, Other) Foreign govt. (EU, Intl. org., Other)					*Total financed by abroad*
Total	*Total performed in BE*	*Total performed in Gov*	*Total performed in PNP*	*Total performed in HE*	***TOTAL GERD***

Classifications

- Institutional classification
- Type of activity
- Fields of Science
- Socio-Economic Objective
- Level of formal qualification (ISCED)
- Fields of Education and Training (ISCED)

Institutional classification

- **Business enterprise** (all firms, organisations and institutions whose primary activity is the market production of goods or services (other than higher education) for sale to the general public at an economically significant price, as well as the private non-profit institutions mainly serving them. Includes public enterprises).
- **Government** (all departments, offices and other bodies which furnish, but normally do not sell to the community, those common services, other than higher education, which cannot otherwise be conveniently and economically provided, as well as those that administer the state and the economic and social policy of the community, as well as NPIs controlled and mainly financed by government, but not administered by the higher education sector Public enterprises are excluded.)

Institutional classification (continued)

- **Private non-profit** (Non-market, private non-profit institutions serving households (*i.e*. the general public), private individuals or households).
- **Higher education** (All universities, colleges of technology and other institutions of post-secondary education, whatever their source of finance or legal status; all research institutes, experimental stations and clinics operating under the direct control of or administered by or associated with higher education institutions).
- **Abroad** (All institutions and individuals located outside the political borders of a country, except vehicles, ships, aircraft and space satellites operated by domestic entities and testing grounds acquired by such entities; all international organisations (except business enterprises), including facilities and operations within the country's borders).

Type of activity

- Basic research.
- Applied research.
- Experimental development.

Fields of Science (draft new classification)

1. Natural Sciences
- 1.1 Mathematics, computer sciences, information sciences
- 1.2 Physical sciences
- 1.3 Chemical sciences
- 1.4 Earth and related environmental sc.
- 1.5 Biological sciences
- 1.6 Other natural sciences

2. Engineering and Technology
- 2.1 Civil engineering
- 2.2 Electrical, electronic, information eng.
- 2.3 Mechanical engineering
- 2.4 Chemical engineering
- 2.5 Material engineering
- 2.6 Medical engineering
- 2.7 Environmental engineering
- 2.8 Biotechnology
- 2.9 Nano-technology
- 2.10 Other engineering and tech.

3. Medical Sciences
- 3.1 Basic medicine
- 3.2 Clinical medicine
- 3.3 Health sciences
- 3.4 Other medical sciences

4. Agricultural Sciences
- 4.1 Agriculture, forestry, and fishery
- 4.2 Animal and dairy science
- 4.3 Veterinary science
- 4.4 Other agricultural sciences

5. Social Sciences
- 5.1 Psychology
- 5.2 Economics and business
- 5.3 Educational sciences
- 5.4 Sociology
- 5.5 Law
- 5.6 Political Science
- 5.7 Social and economic geography
- 5.8 Media and communications
- 5.9 Other social sciences

6. Humanities
- 6.1 History and archaeology
- 6.2 Languages and literature
- 6.3 Philosophy, ethics and religion
- 6.4 Art
- 6.5 Other humanities

Socio-economic objectives (SEO)

1. Exploration and exploitation of the Earth.
2. Infrastructure and general planning of land use.
3. Control and care of the environment.
4. Protection and improvement of human health.
5. Production, distribution and rational utilisation of energy.
6. Agricultural production and technology.
7. Industrial production and technology.
8. Social structures and relationships.
9. Exploration and exploitation of space.
10. Non-oriented research.
11. Other civil research.
12. Defence.

Other breakdowns recommended by the Frascati Manual

- Sex
- Age (groups): Under 25 years; 25-34 years; 35-44 years; 45-54 years; 55-64 years; 65 years and more.

Classification by Fields of Study (ISCED97)

- **General Programmes** (01 Basic programmes, 08 Literacy & numeracy, 09 Personal development)
- **Education** (14 Teacher training & education science)
- **Humanities and Arts** (21 Arts, 22 Humanities)
- **Social sciences, business and law** (31 Social & behavioural science, 32 Journalism & information, 34 Business & administration, 38 Law)
- **Science** (42 Life sciences, 44 Physical sciences, 46 Mathematics & statistics, 48 Computing)
- **Engineering, manufacturing and construction** (52 Engineering & engineering trades, 54 Manufacturing & processing, 58 Architecture & building)
- **Agriculture** (62 Agriculture, forestry & fishery, 64 Veterinary)
- **Health and welfare** (72 Health, 76 Social services)
- **Services** (81 Personal services, 84 Transport services, 85 Environmental protection, 86 Security services)
- **Not known or unspecified**

HOW do we collect data?

- R&D Surveys. Innovation surveys.
  Combined R&D-innovation surveys.
  -> Good quality questionnaires are needed!
- Administrative data (budget, personnel list)
- S&T management information systems
- Time-use surveys
- Estimations

Different strategies for different sectors:
one size does not fit all!

How do we ORGANIZE a sustainable S&T statistics system?

- Convince policy-makers
- Involve multiple actors
- User/producer consultation
- Create national S&T statistics groups
- Shared ownership of data
- Quality is key – capacity building of producers
- Step-by-step approach
- Combine statistics with S&T information systems
- Network with colleagues from similar countries

Step-by-step approach

- People, then Money
- S&T databases: projects, researchers, institutions, publications
- Sectors (what's easiest? government? HE?)
- First level of the pyramid (taking into account further levels)

Frascati Manual in developing countries

- Adopt vs. adapt (ad@pt?) methodologies
- UIS will produce annex to Frascati Manual on measuring R&D in developing countries

Ad@pting definitions

- Should we measure R&D?
- Should we measure only R&D?
- Should we not measure R&D?
- Should we measure innovation (in business)?
- Should we use international definitions at country level?
- What else should we measure?
- What does not fit the definitions proposed?

Thank you!

e.fernandez-polcuch@uis.unesco.org

http://www.uis.unesco.org

UNESCO Institute for Statistics
C.P. 6128 Succursale Centre-ville,
Montreal, Quebec, H3C 3J7,
Canada.

TP: (1 514) 343-6880
Fax: (1 514) 343-6872