

EUROPEAN COMMISSION
Joint Research Centre

European Researchers: what do we know about them?



Olivier Da Costa
Bernard Clements, Patrice Laget, Paola Di Pietrogiacomo, Gérard Carat,
Philippe Moguerou, Pauline Mattsson
EC-JRC-IPTS, Seville

"The Researcher - a factor for the development of the knowledge society"
28-29 November 2005 Sofia

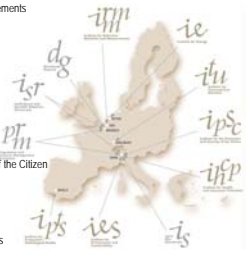
EUROPEAN COMMISSION
Joint Research Centre

Structure of the JRC

7 Institutes in 5 Member States

- IRMM - Geel, Belgium
- Institute for Reference Materials and Measurements
Staff: **250**
- IE - Petten, The Netherlands
- Institute for Energy
Staff: **180**
- ITU - Karlsruhe, Germany
- Institute for Transuranium elements
Staff: **250**
- IPSC - IHCP - IES - Ispra, Italy
- Institute for the Protection and the Security of the Citizen
- Institute for Health and Consumer Protection
- Institute for Environment and Sustainability
Staff: **350, 250, 370**
- IPTS - Seville, Spain
- Institute for Prospective Technological Studies
Staff: **120**

Total staff: **~ 2200 people**



EUROPEAN COMMISSION
Joint Research Centre

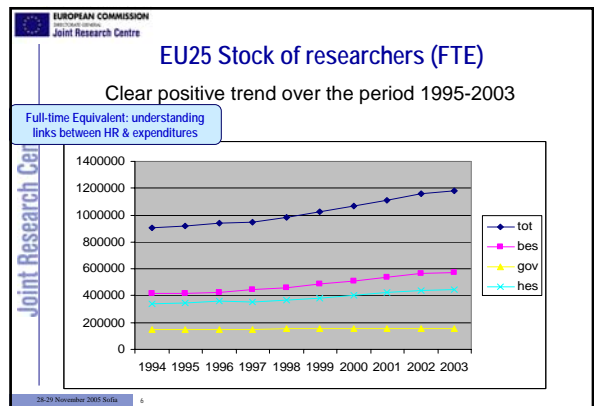
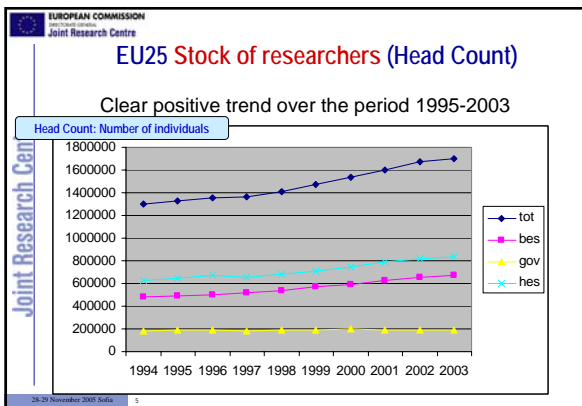
Content

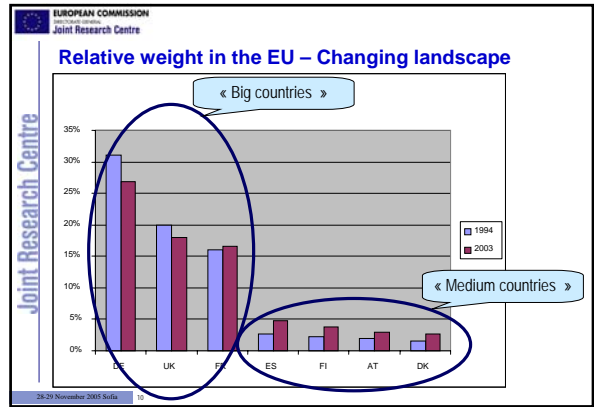
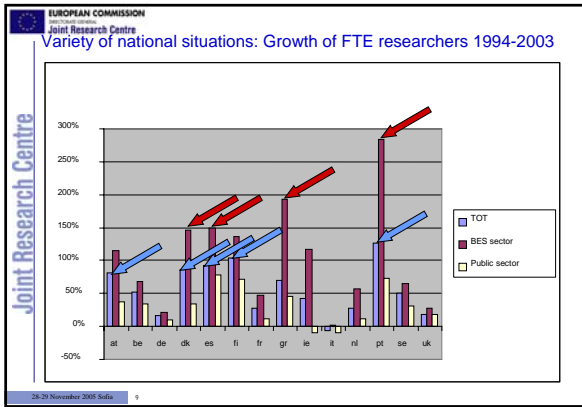
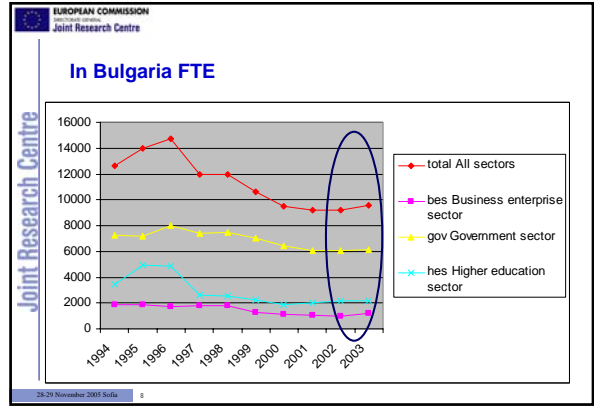
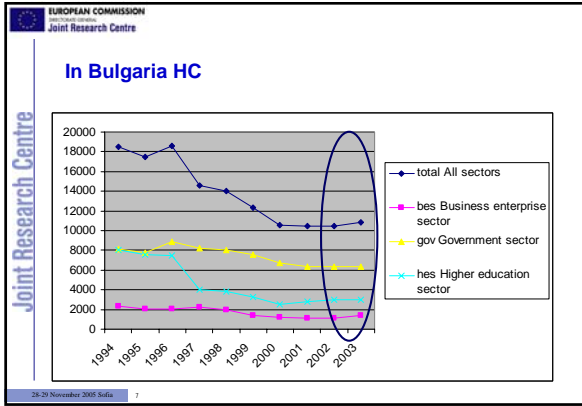
- Researcher stocks & supply
- Researcher mobility & career
- (IPTS and JRC)

EUROPEAN COMMISSION
Joint Research Centre

IISER- Integrated Information System on European Researchers

- Lack of reliable information needed for policy analyses / decisions:
"There is a need for a novel instrument to measure and monitor HR for S&T in Europe"
(Gago Report 2004)
- Feasibility study to define characteristics and costs of such a system (Dec. 2004 to Feb. 2006)
- Co-financed by DG RTD, carried out in partnership with EUROSTAT and in co-operation with OECD / UNESCO / CREST





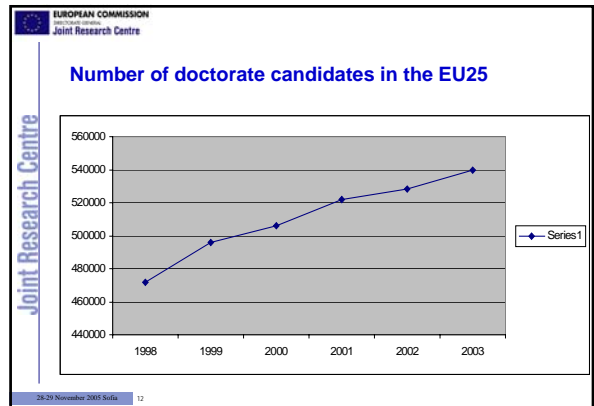
EUROPEAN COMMISSION
Joint Research Centre

Numbers of researchers (FTE) & expenditures (in 1995 constant PPS) between 1995 and 2003

	Total	Higher edu	Gover	Business	Manufacturing	Services
Researchers	29%	29%	3%	38%	24%	151%
Expenditures	29%	37%	3%	33%	25%	122%

→ Correlation between growth of HR and expenditures
 → Business contribution to growth the most significant
 → Within Industry, growth higher in service sectors
 → Constant total expenditure per researcher, but only due to an increasing contribution from the higher education sector
 → Stagnation in government sector

28-29 November 2005 Sofia 11



EUROPEAN COMMISSION
Joint Research Centre

Joint Research Centre

Mobility & Career

- Supported by a network of national experts to collect and validate national data in 9 EU FP countries
 - Largest: France, Germany & UK (more than 70% total researchers)
 - Mediterranean: Italy & Spain
 - Scandinavian: Norway (even non-EU) & Sweden
 - New MS: Czech Republic & Poland
- 93 national and international data sources identified (LFS, R&D Surveys, Registers, Ad-Hoc Surveys)
- Focuses on:
 - International mobility
 - Sectoral mobility (public/private sectors)
 - Functional mobility (R&D to non R&D functions)
 - Positional mobility (temporary to permanent positions)

28-29 November 2005 Sofia 13

EUROPEAN COMMISSION
Joint Research Centre

Joint Research Centre

International Mobility

- International mobility of researchers increasing at a global level (idem for students, sharp increase on the last few years)
- Proportion of "foreign" researchers greater in some EU countries (e.g. UK, FR, SE)
- Comparatively, researchers in life sciences more mobile, particularly in the new interdisciplinary areas (molecular genetics, biophysics etc.) (DE)
- USA most attractive country for post-doc activities, particularly in life sciences
- Brain-drain to the USA not confirmed in quantitative sense (FR, SE), but qualitatively the US took 'the best of the best' (DE)
- Brain circulation more appropriate than brain drain to describe the current situation
- Non-national researchers more highly-qualified than nationals (UK)
- Great variety in subjective push and pull factors – order of influence differs: research facilities, career opportunities, income (IT, ES, DE, SE)

28-29 November 2005 Sofia 14

EUROPEAN COMMISSION
Joint Research Centre

Joint Research Centre

Sectoral Mobility

- In CZ, NO, PL, ES most researchers work in the public sector
- In FR, DE many researchers in the private sector are engineers
- Discipline-specific distribution between public and private sectors
- Globally, share (and absolute number) of researchers in private sector growing
- Relatively small mobility between both sectors, mainly in the early career (DE, FR), and mainly one way
- Different schemes of sectoral mobility (i.e. one-way and return mobility)
- Gender-specific mobility patterns
- Large mobility between institutions belonging to one sector
- Researchers in private sector have on average a lower educational level (no PhD) than those in public sector (CZ, NO, PL, ES)
- Data available for university researchers holding from EPO show that mobility away from academia is significant phenomenon, involving 20% of the inventors surveyed
- Incentives for sectoral mobility seem to be better employment conditions and higher wages in the private sector (SE, FR). Still, not clearly demonstrated.

28-29 November 2005 Sofia 15

EUROPEAN COMMISSION
Joint Research Centre

Joint Research Centre

Functional Mobility - R&D to non-R&D

- Moving out of R&D tends to occur in the later stages of the career
- Occurs more often in the private sector (internal or as part of sectoral mobility)
- Possible pull factor in private sector: higher wage levels (SE, FR)
- In the private sector, within the same firm more people move from R&D to non-R&D functions than vice-versa.
- However, French engineering surveys show that there is also an inflow into research functions
- Scattered data on researchers' first years after graduation show that mobility out of R&D is larger than international mobility ('brain-drain')
- Field-specific mobility patterns (DE)
- External factors mostly influence decision quit research (PL)

28-29 November 2005 Sofia 16

EUROPEAN COMMISSION
Joint Research Centre

Joint Research Centre

Positional mobility - from non-permanent to permanent positions

- Positional mobility appears to occur early in the career (FR, DE, SE) and usually includes an upgrade (DE, FR)
- Positional mobility depends on the economic sector, area of activity, gender
- Overall worsening of employment conditions in public sector:
 - Increasing temporary appointments & fixed-term contracts in the Higher Education sector (DE, FR, IT, UK). Situation in Sweden described as "a jungle of short-term appointments". UK also strongly developed temporary positions.
 - Bottleneck problems when openings do not compensate retirements (SE, IT)
 - An Italian study highlights personal problems in insecure working situations. Job insecurity decreases job satisfaction (US, FR).

28-29 November 2005 Sofia 17

EUROPEAN COMMISSION
Joint Research Centre

Joint Research Centre

Preliminary conclusions on the supply/demand balance

- EU researchers currently number about 1.2 M (FTE)
- To fulfil the 3% investment target, half a million new researchers needed over the coming decade, assuming current investment-per-researcher figures¹
- Extrapolating current trends, a supply of about 2.4M science and engineering (S&E) graduates over this timeframe can be expected
- Required number of researchers can be met if 40-50% of S&E graduates choose a research career
- But is the question in terms of quantity or quality?

¹ Gago, J. M. (2004), Increasing human resources for Science and Technology in Europe, Report by the High Level Group on Increasing Human Resources for Science and Technology in Europe, presented to the EC conference "Europe needs more scientists", Brussels, 2 April 2004.

28-29 November 2005 Sofia 18

EUROPEAN COMMISSION
Joint Research Centre

Joint Research Centre

Outlook for the future

- Growing signals that enrolment in S&T studies is decreasing (i.e. DE)
- Why would younger Bulgarians / Europeans want to undertake S&E study / a career in research?
 - Salaries for PhDs lower than those of MBAs 3 years after graduation.
 - Discouraging temporary positions (insecurity) in research
 - Real issue on the demand rather than supply side
 - Recent graduates need to have a better visibility for a research career
- What's the meaning of the "Knowledge Society" for young Bulgarians / Europeans?

28-29 November 2005 Sofia 19

EUROPEAN COMMISSION
Joint Research Centre

Joint Research Centre

Complementary material not presented at the conference

28-29 November 2005 Sofia 20

EUROPEAN COMMISSION
Joint Research Centre

Joint Research Centre

IISER Project Methodology

WP 1 Information Collection

- Identification of available data sources, research activities and centres of expertise by country
- Information collection and validation processes
- Test of the ad-hoc experts' group

WP 2 Mapping of Available Information

- Screening of data relevance
- Catalogue of relevant collection methodologies
- Development and validation of a meta-structure
- Identification of data gaps by country

WP 3 Intelligence Service

- Exploitation of relevant study results
- Synthesis of information
- Definition of analytical gaps
- Identification of trends
- Identification of collection best practices

WP 4 Intermediate Review

- Small-scale focussed workshop
- Implementation of the action

WP 5 Specifications of the Integrated Information System

- Recommendations for engineering a sustainable system
- Development of a Directory of Centres of Expertise
- Roadmap of the Integrated Information System
- New SSA proposal

WP 6 Management, Concertation, Reporting & Dissemination

- Project management, ongoing assessment & reporting to DG RTD
- Concertation with users
- Exploitation and dissemination of the outcomes

28-29 November 2005 Sofia 21

EUROPEAN COMMISSION
Joint Research Centre

Joint Research Centre

Three Major Elements of the Monitoring System of European Researchers

1. Social reports on data sources, on analysis of an researcher career and mobility

2. Working group on harmonization and adaptation of statistical systems

3. New regular survey system (GradBar + DocBar)

28-29 November 2005 Sofia 22

EUROPEAN COMMISSION
Joint Research Centre

Joint Research Centre

Elements of the Monitoring System of European Researchers

1. New Survey System

2. New ad hoc surveys

3. National data sources: national systems, research centres, regions, universities, other, non-tertiary

4. International data sources: IATA, IATA, OECD, IATA, OECD

EU Mobility Monitor

28-29 November 2005 Sofia 23

EUROPEAN COMMISSION
Joint Research Centre

Joint Research Centre

Focus on IPTS – the Institute for Prospective Technological Studies

IPTS' Mission

The mission of IPTS is to provide customer-driven support to the EU policy-making process, by researching science-based responses to policy challenges that have both a socio-economic as well as a scientific/technological dimension

28-29 November 2005 Sofia 24

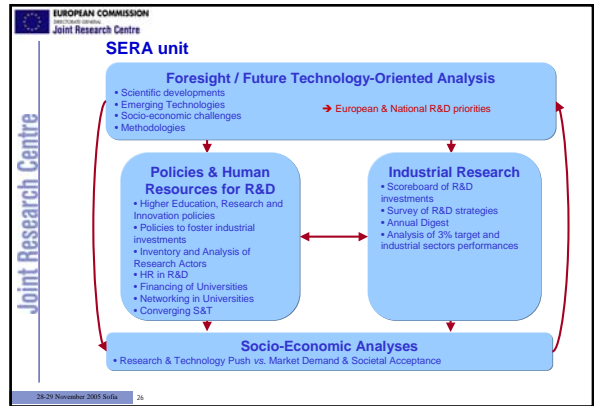
EUROPEAN COMMISSION
Joint Research Centre

Support to European Research Area

Action: Policies and Human Resources for Research (ERAWATCH)
Action: European Foresight (FOR-ERA)
Action: Industrial Research and Innovation (IRI)

Success Story: First EU Industrial R&D Investment Scoreboard. As part of its support to the implementation of the EU's Investing in Research action plan, IPTS published the first EU Industrial R&D Investment Scoreboard. It provides instructive, up-to-date comparisons between companies, sectors, and geographical areas, as well as a picture of the competitive situation of EU firms in the global R&D environment.

28-29 November 2005 Sofia 25



EUROPEAN COMMISSION
Joint Research Centre

Support to Information Society Policy

Action: Foresight on Information Society Technologies in Europe (FISTE)
Action: Prospective Cybersecurity Activities (PRIDIS)

Success Story: FISTERA: a platform bringing together national foresight exercises on the Information Society, developing a common view on key technologies for the future

Success Story: Study on "Biometrics at the Frontiers: Assessing the Impact on Society" for the European Parliament, assessing the technological, social, ethical, legal and economic challenges posed by biometric identification methods

28-29 November 2005 Sofia 27

EUROPEAN COMMISSION
Joint Research Centre

Support to Environment and Sustainability Policies

Action: European IPPC Bureau

Action: Clean Technologies: Prospective techno-economic analyses and scenarios (CLEANTECH)

Action: Energy and Industrial Greenhouse Gas (GHG) Emission Scenarios: Techno-economic assessment of mitigation policies

Action: Energy Technologies Modelling and Scenarios Project (ETMOS)

Success Story: IPTS' input to DG ENV An analysis of *Russian arguments against ratifying the Kyoto Protocol* was used as negotiating arguments vis-à-vis the Russian Federation to ratify Kyoto.

Success Story: Introduction and implementation of EU policies: EIPPC Bureau

28-29 November 2005 Sofia 28

EUROPEAN COMMISSION
Joint Research Centre

Support to Agriculture, Food and Health

Action: Sustainable Agriculture (SUSTAG)
Action: Life sciences and technologies in health and agro-food (LIFETECH)

Success Story: Scenarios for co-existence of genetically modified, conventional and organic crops in European agriculture. Report.

This study assessed the consequences of increasing proportions of genetically-modified crops on current farming practices, covering oilseed rape for seed production, maize for feed production and potatoes for consumption, and several farm types (organic and conventional).

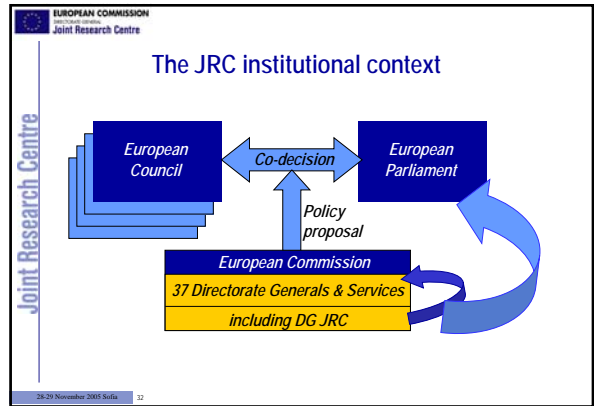
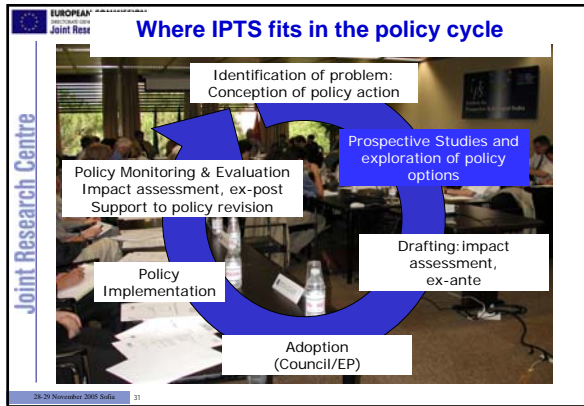
28-29 November 2005 Sofia 29

EUROPEAN COMMISSION
Joint Research Centre

IPTS' Main Customers

- DG Research
- DG Information Society
- DG Environment
- DG Agriculture
- DG Transport and Energy
- DG Enterprise
- European Parliament

28-29 November 2005 Sofia 30



The JRC Mission

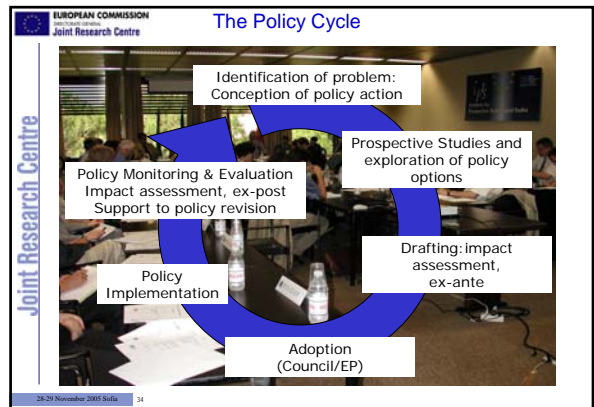
The JRC provides customer-driven **scientific and technical support** for the conception, development, implementation and monitoring of **EU policies** ...

...functions as a **reference centre of science and technology** for the EU.....

...serves the common interest of the Member States, while being **independent of special interests**, whether private and national."

Joint Research Centre

28-29 November 2005 Sofia 33



Research-based Policy Support

A significant proportion of EU legislation has a scientific & technological basis

- food, chemicals, environment, energy, information society, etc.

As a Directorate General (DG) of the European Commission, the JRC provides scientific and technical support to Community policy-making

In the last 2 years, the JRC was involved in over 70 pieces of EU legislation

Joint Research Centre

28-29 November 2005 Sofia 35

JRC Work Programme 2003-2006

Food, Chemical Products and Health (food safety & quality, food chain & consumer protection, GMOs, chemical products, alternative testing methods, biomedical technologies, health & environment) - **IHCP, IRMM, IES, IPTS**

Environment and Sustainability (air, water & soil quality, land resources, sustainability issues, climate change, ecosystem monitoring, energy technologies) - **IES, IPTS**

Nuclear Safety and Security (waste treatment & storage, nuclear non-proliferation, reactor safety, radiation monitoring, basic actinide research) - **ITU, IPSC**

S&T Foresight (technology & techno-economic foresight, statistical methods for analysis of economic indicators) - **IPTS**

Reference Materials and Measurements (reference materials & methods, certified reference materials, radionuclide metrology, neutron data measurements) - **IRMM, ITU**

Public Security and Antifraud (antifraud technologies, cybersecurity, technological & natural emergencies, humanitarian aid) - **IPSC, IPTS**

Joint Research Centre

28-29 November 2005 Sofia 36

EUROPEAN COMMISSION
Joint Research Centre

Working for the JRC

CORE STAFF 2004

Total = 1625 staff

JRC Staff

- Policy of attracting bright and able scientists
- Multi-national skills and talents
- Scientific and cultural diversity
- Policy-aware

VISITING STAFF 2004

Total = 744 staff

Categories of research staff

- Visiting Research Fellows, cats. 20, 30 & 40
- Seconded National Experts & Auxiliary staff
- Temporary Agents & Permanent Officials

Interested in working with the JRC?

Email: JRC-recruitment@cec.eu.int
 Web: <http://www.jrc.cec.eu.int>

28-29 November 2005 Sofia 17

EUROPEAN COMMISSION
Joint Research Centre

Financing the JRC

Funded from a specific part of the RTD Framework Programme - that for 'direct' research (about 5% of the total FP budget)

Current 'institutional' funding under FP6 is **1050 MEuro** over the 4 years of the Programme (2003-2006)

Budget Breakdown (Meuro)

This institutional funding is complemented by competitive earnings through:

- participation in FP6 indirect actions
- direct funding by Commission DGs for specific programmes of work
- some work for third parties

28-29 November 2005 Sofia 18