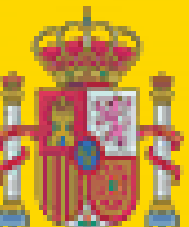




# ICT research activities in Spain and EU connections

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**International Relations, area IST**  
**Dirección General de Investigación**  
**Ministry of Education and Science**



MINISTERIO  
DE EDUCACION  
Y CIENCIA



# Outline of the presentation

- **The Spanish RTD System**
  - **RTD Policies**
  - **Basic Features, Comparisons and Evolution**
- **Research on ICT**
  - **Organization**
  - **Indicators and data**
- **European Dimension**
  - **Spanish Participation in the 6th PF – IST**
  - **Eureka**
  - **Towards the 7th PF**
  - **Possibilities for cooperation: INCO, Erasmus Mundus, etc**





# The Spanish RTD System

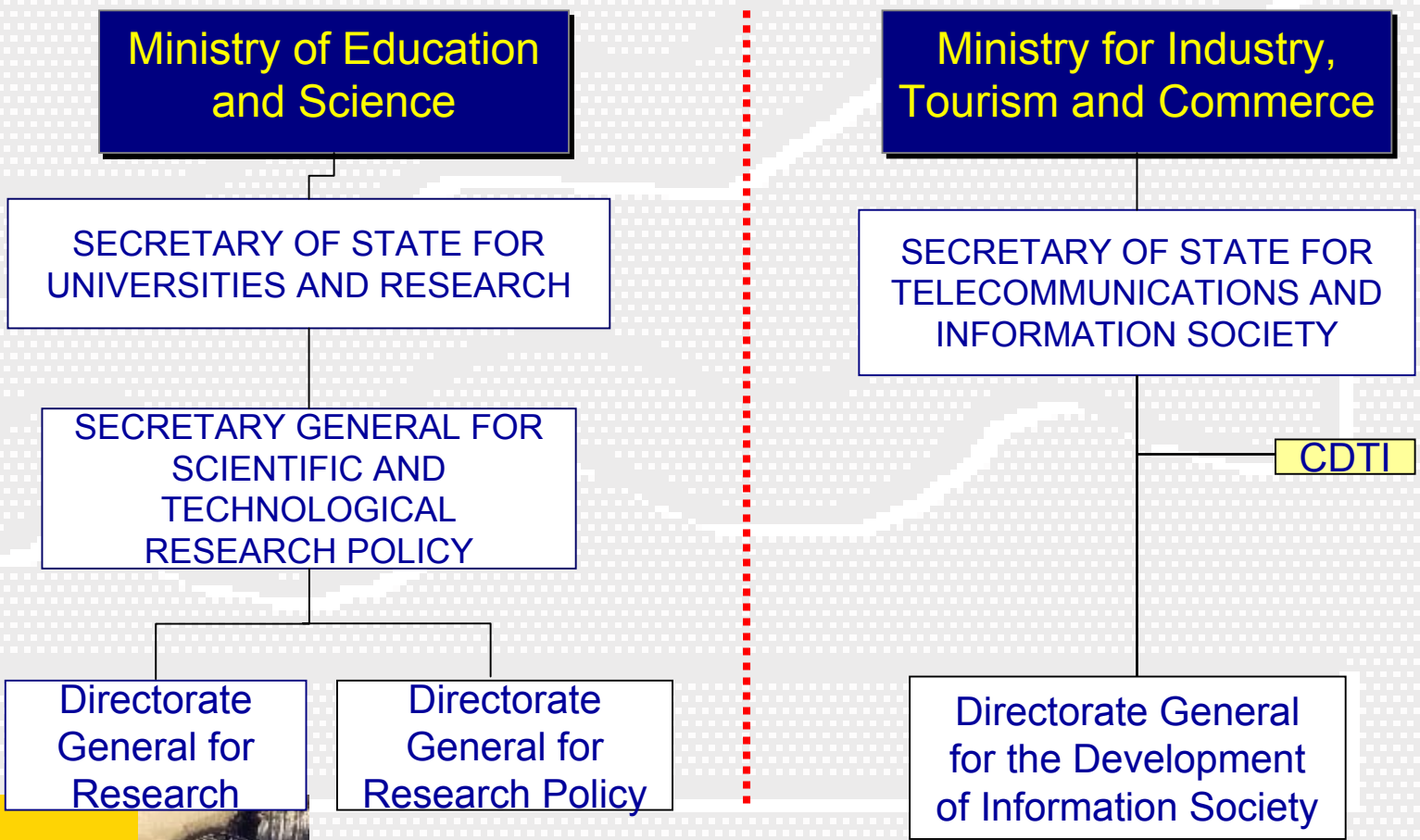
## RTD Policy





# Spanish RTD Policy

Managed by the **Ministry for Education and Science** and **Ministry for Industry, Tourism and Commerce**.





## Guided by the National R+D+I Plan

- Increase the level of S+T, both in quality and in quantity
- Raise the level of competitiveness of enterprises and encourage their innovation capacity
- Improve the use of R+TD results by enterprises and Spanish society as a whole
- Strengthen the internationalization of the Spanish S+T
- Increase the qualified human resources both in the public and the private sectors
- Raise the level of scientific and technological knowledge of the Spanish society
- Improve the coordination, evaluation and technical monitoring procedures of the National Plan
- Improvement of infrastructure of S+T





## Public funding mechanisms for research

RTD funding in Spain is mainly done through Annual State Budget.

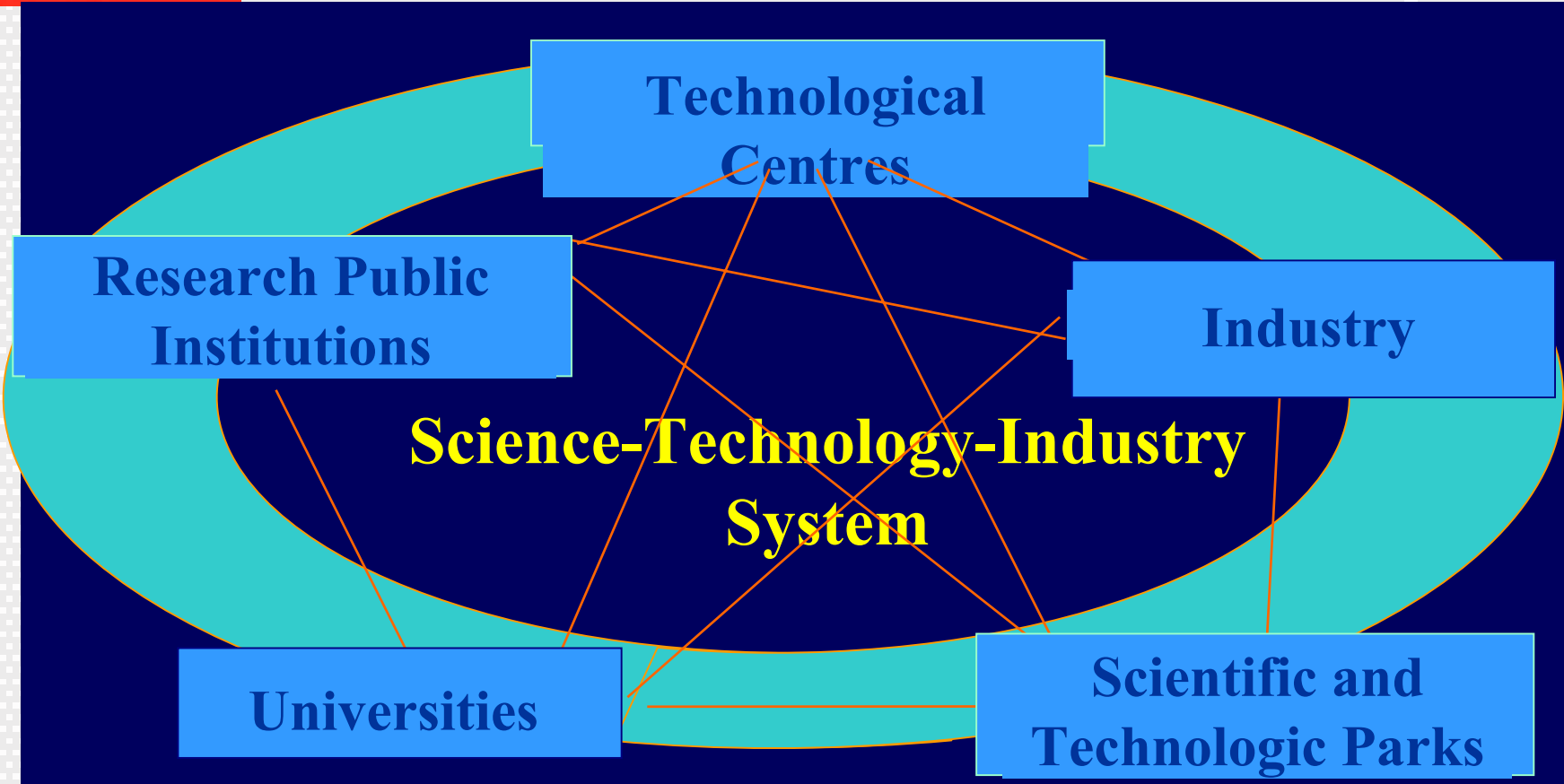
There is a four year lasting National Plan for Research, Development and Innovation (2004-2007), structured on National Programmes, with identified objectives and priority lines.

Every year different type of actions are identified by public call for proposals and funded after a process of evaluation: anonymous peer review for R+D projects, and technical evaluation for innovative projects.

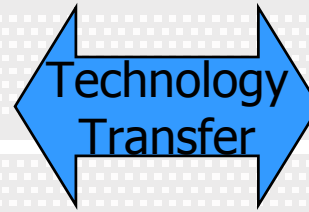




# R+D SPANISH SYSTEM



Knowledge Generation  
Scientific Publications



Technology generation  
Patents





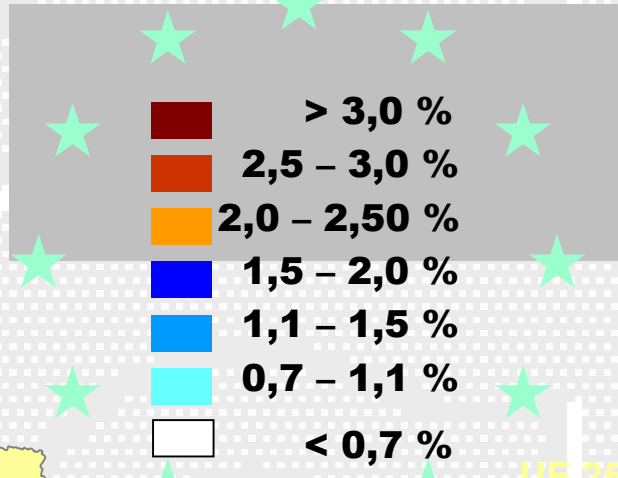
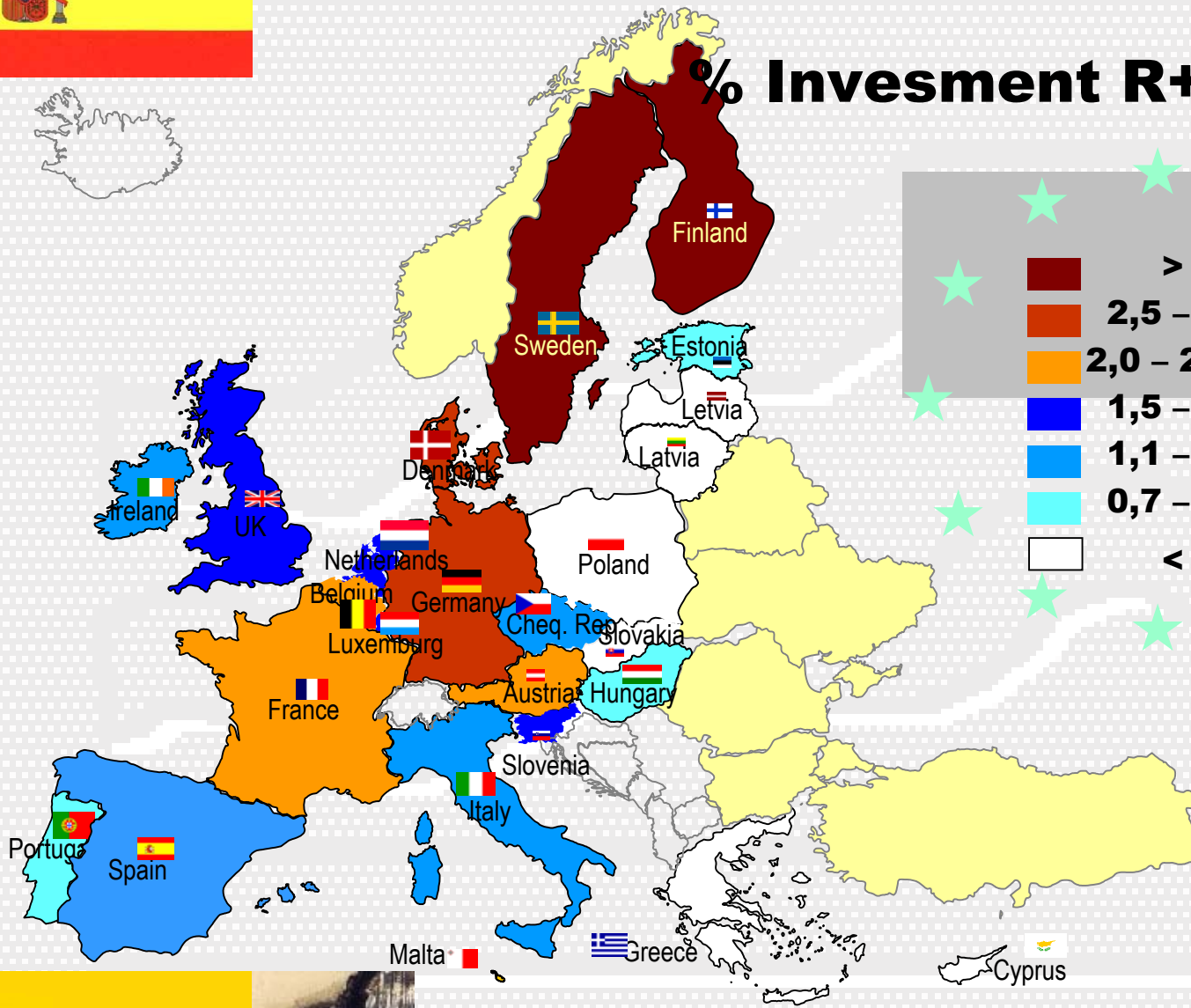
- **The Spanish RTD System**  
**Basic data, Comparison**  
**and Evolution**







# % Investment R+D in EU/GPI



EU 25	1.93
EU 15	1.99
EEU	2.64
Japan	3.12

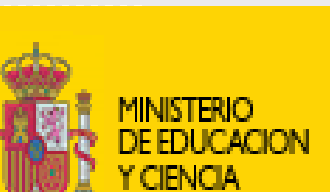
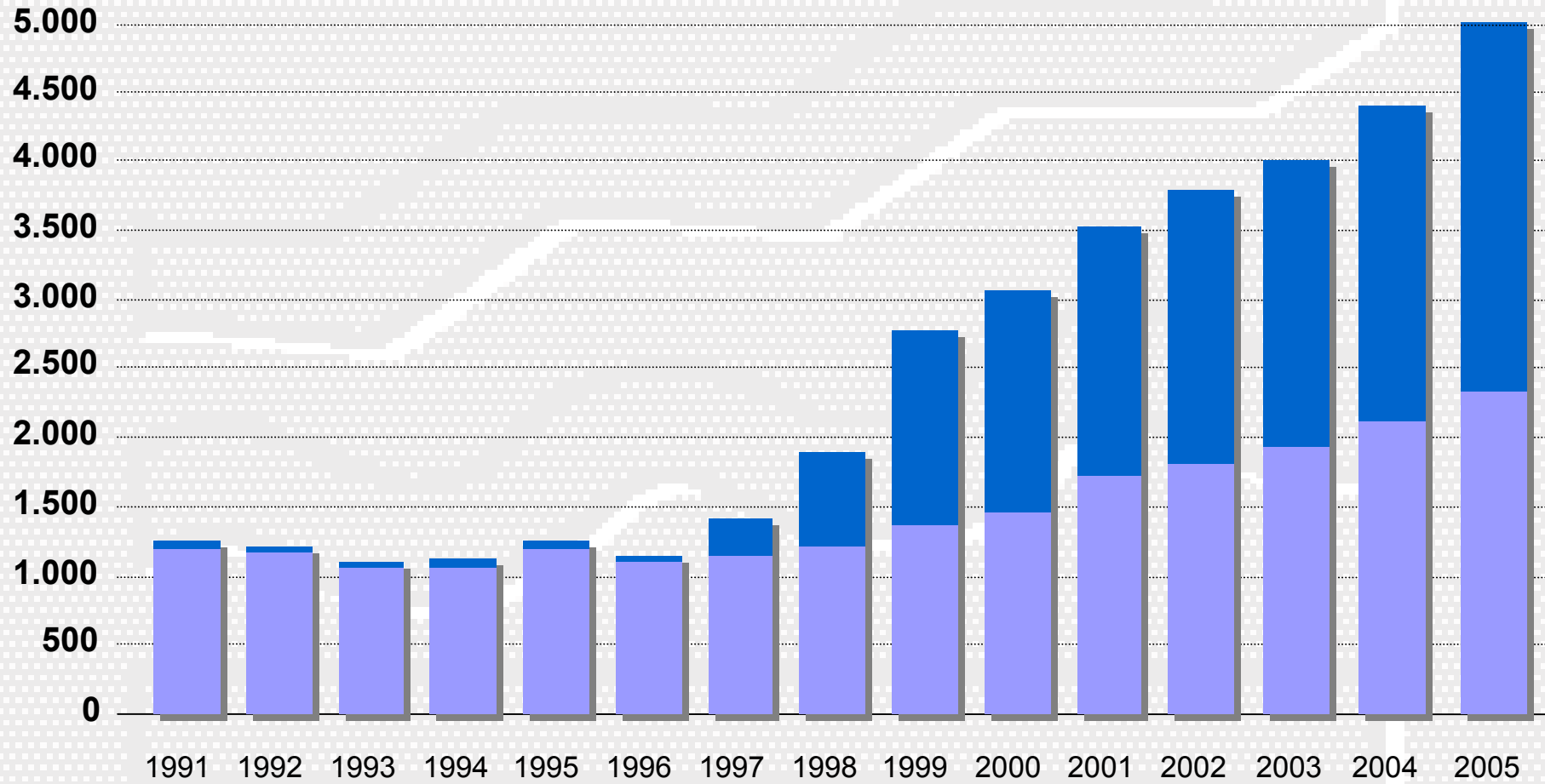




# Public Investment in R+D M€

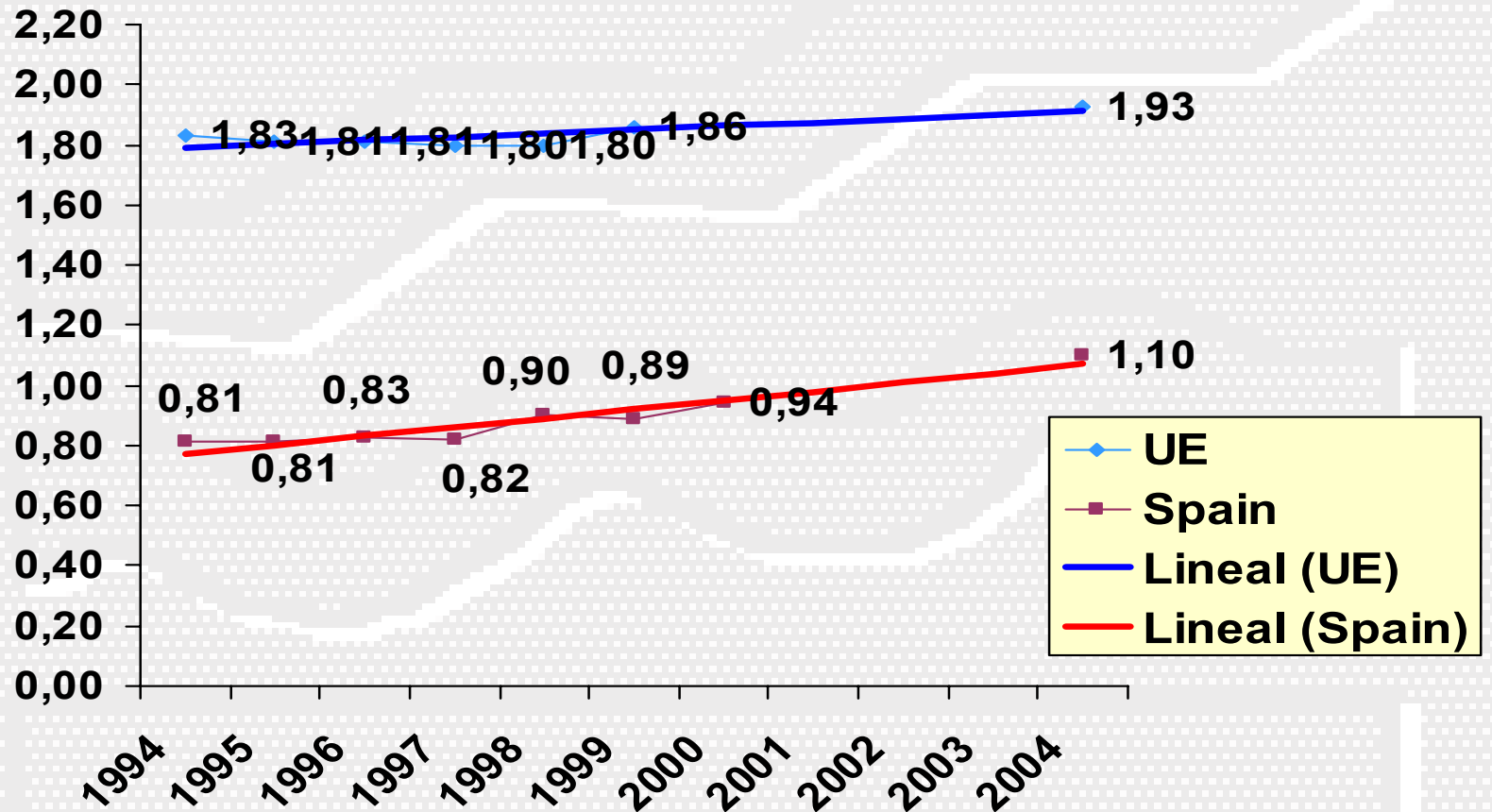
GRANTS

LOANS



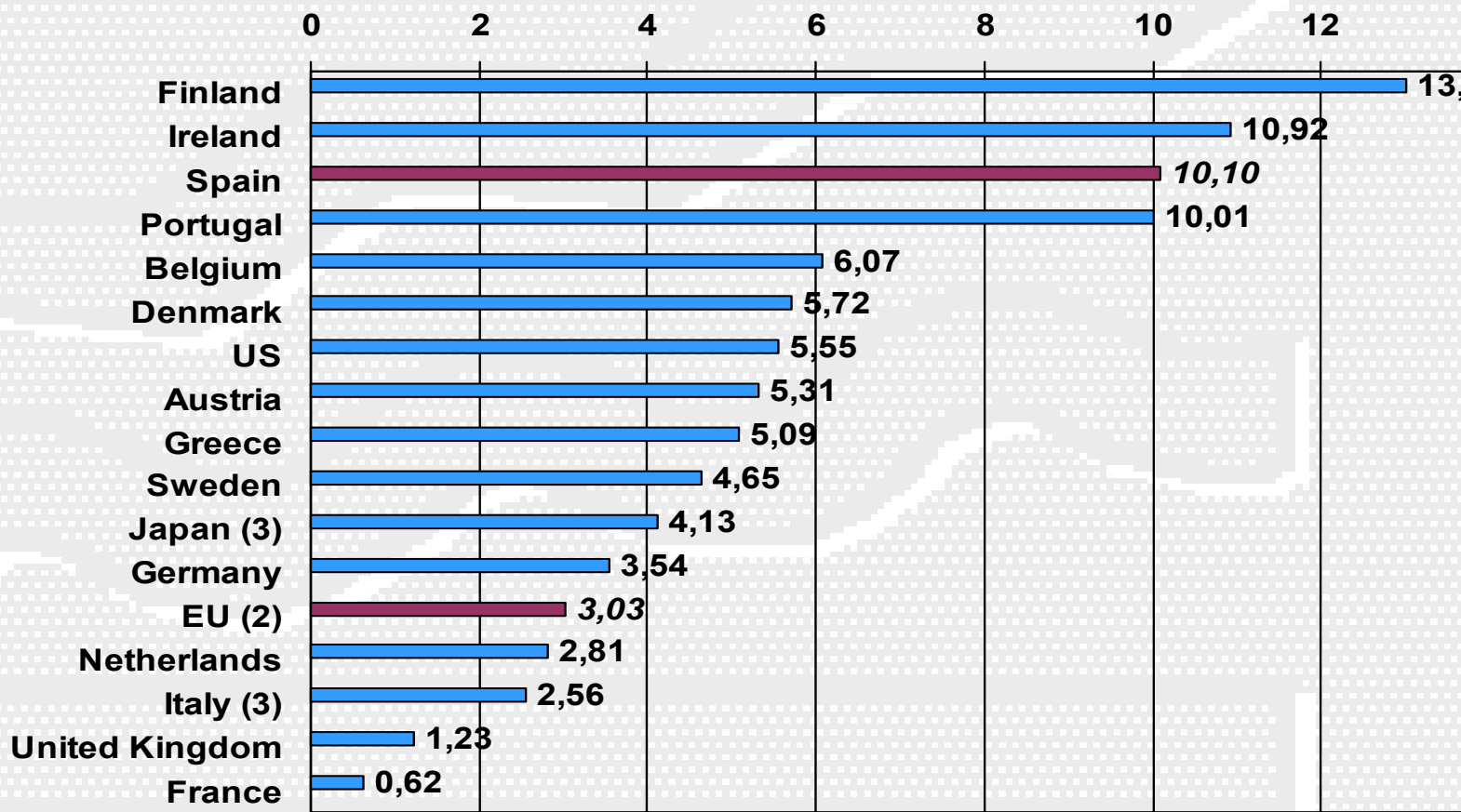


### GERD AS A PERCENTAGE OF GDP



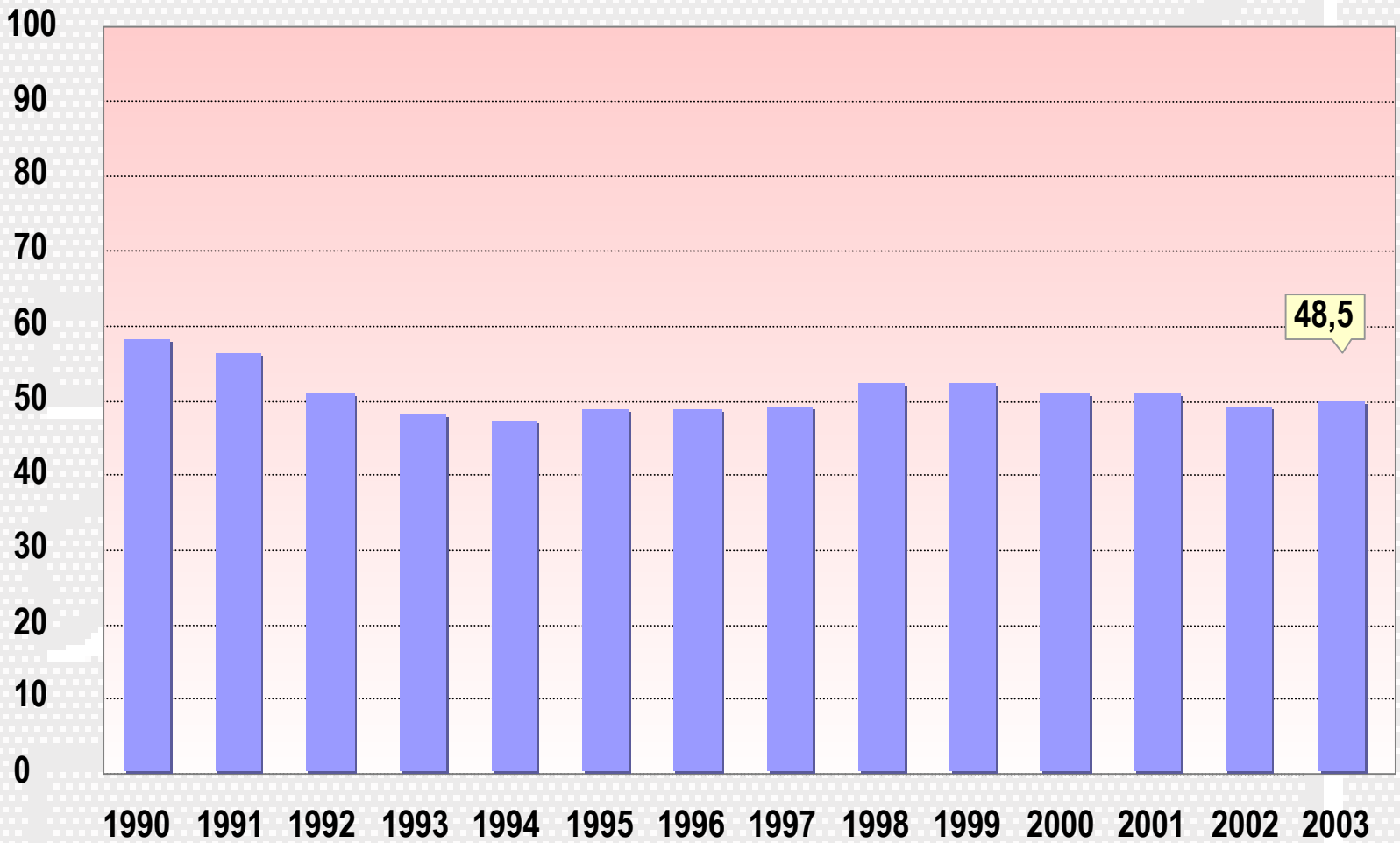


# R+D EXPENDITURE –AVERAGE ANNUAL REAL GROWTH (%),



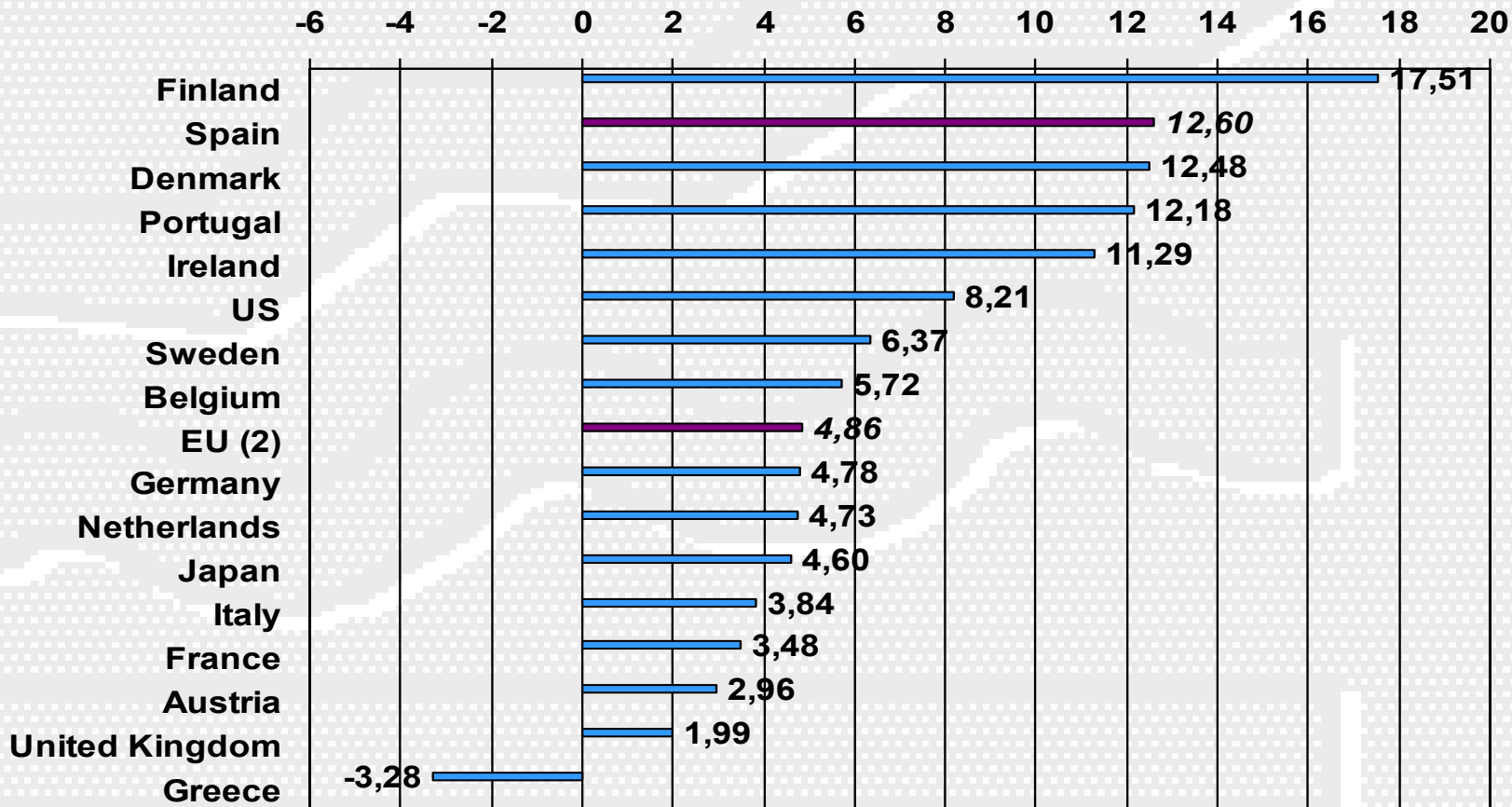


# % Private investment in R+D



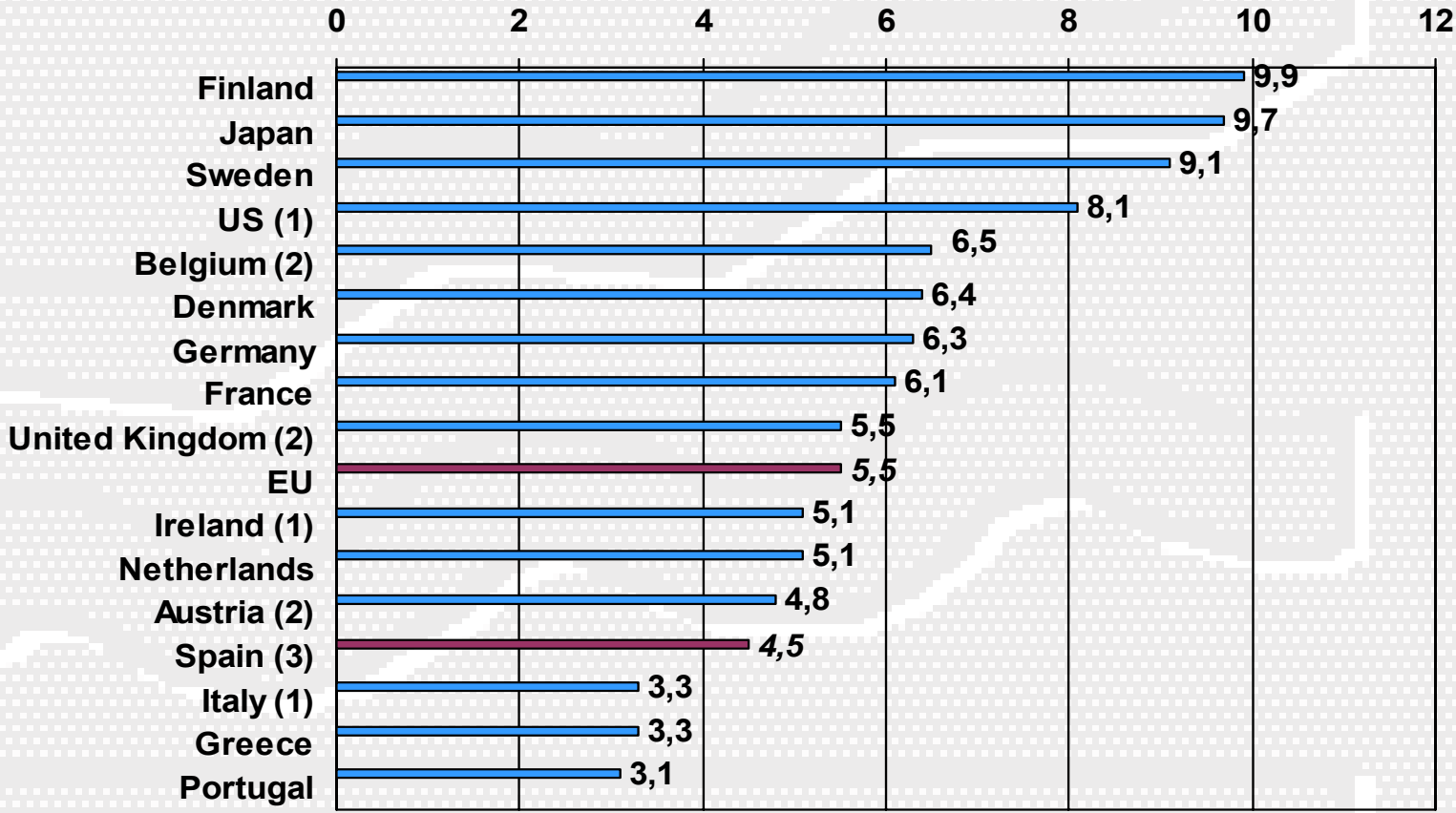


## INDUSTRY FINANCED R+D –AVERAGE ANNUAL REAL GROWTH (%),





## TOTAL RESEARCHERS PER THOUSAND LABOUR FORCE



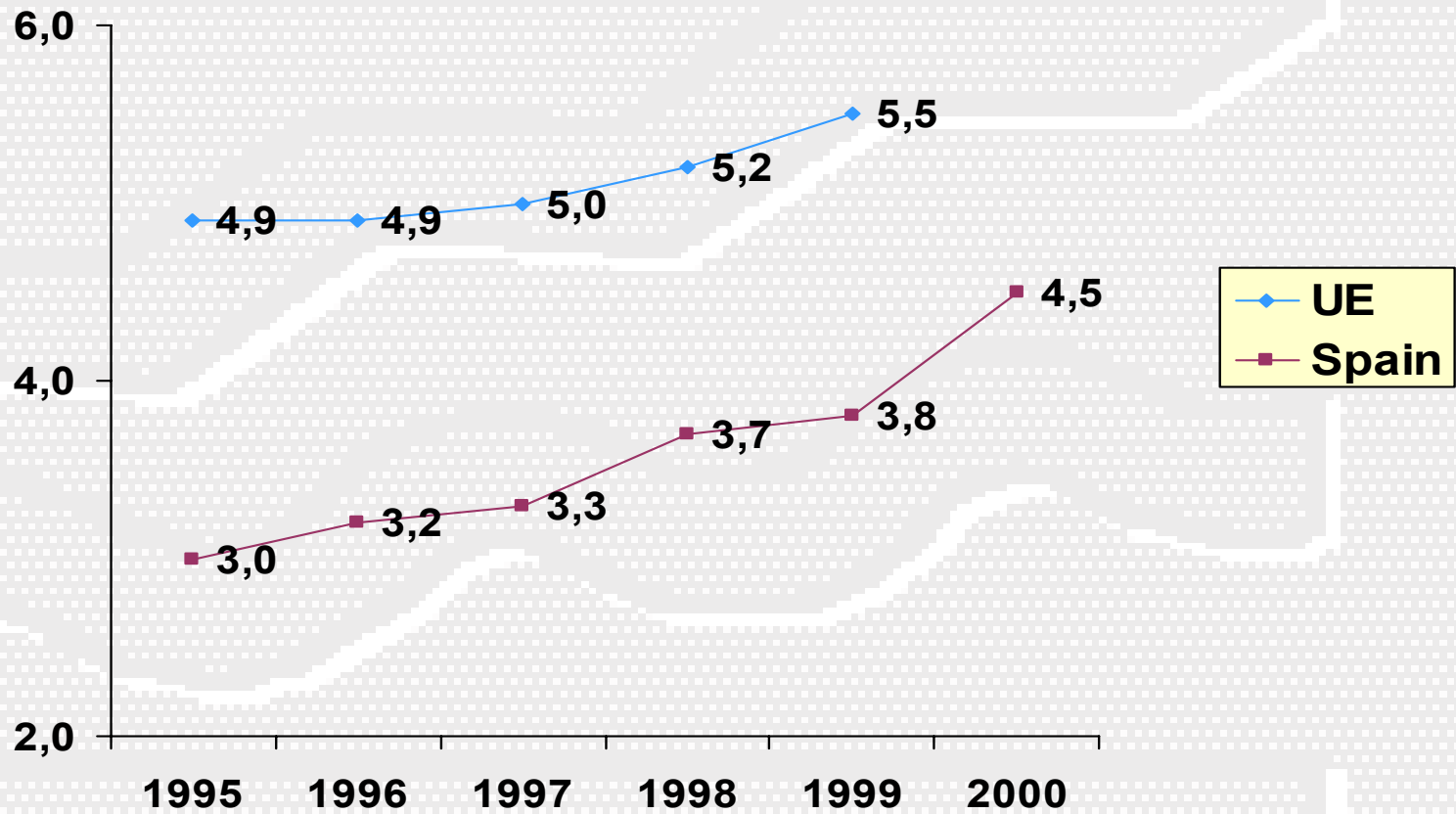
Source: OECD, Main Science and Technology Indicators, November 2001

Notes: Data 1999; (1) 1997; (2) 1998; (3) 2000 (estimated)





### TOTAL RESEARCHERS PER THOUSAND LABOUR FORCE



Source: UE: OECD, Main Science and Technology Indicators, November 2001; Spain: INE 2001







# The INGENIO 2010 Initiative

New plan: **Ingenio 2010**: Towards the Lisbon objective

- From “individual”, small, short time projects to ambitious, longer, consortium based, bigger projects.
- Scientific knowledge converted into economic value.
- Cooperation along the whole R+D system.
- Industry seriously involved into the R+D plans

	EU (2004)	SPAIN (2004)	EU Goal 2010	Ingenio2010
%GPD	2%	1,1%	3%	2%
PUBLIC	42%	52%	34%	45%
PRIVATE	58%	48%	66%	55%





# Instruments of the National R+D+I Plan

- 1. Research projects**
- 2. Scientific and technological research (Profit)**
- 3. Strategic scientific and technological projects (CENIT)**
- 4. Scientific and Technological Networks (RENACE)**
- 5. Human Resources**
6. Support for projects for international cooperation
7. Support for the creation of technological based enterprises
8. Regional actions for the technological development
9. Scientific and Technological Infrastructures
10. Promotion, commercializations, and spread of R+D results





# Research Projects

## Calls and bids for R+D projects

- Reinforcing excellence in research through competitive funding: Public Research Institutions (PRI)
- One call early every year, decision at end of year
- Around 5.000 proposals, 2.400 funded every year
- 300 M€ approved
- Organized in several priorities:
  - National RTD areas and programmes: Space, Health, Biotechnology, Materials, **IST**, ...





## Human Resources

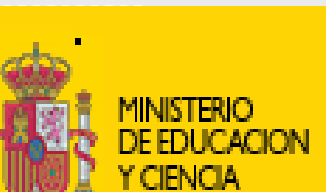
Increasing number and quality of human resources in RTD

### Predoctoral fellowships (FPI)

- Fellowships to perform a Ph.D. thesis are linked to the best R+D projects, whose teams are well evaluated for their training capacity.
- 750 new fellowships every year for  $\approx$  2500 candidates
- Total running fellowships MCYT:  $\approx$  2,000 (54% women).

### Ramón y Cajal/Juan de la Cierva Programme

- A step in a “researcher’s career (tenure track, 5 years) in order to stabilize and improve the working conditions of “post-doc” researchers and to facilitate the return of researchers working abroad





## Instruments of the National R+D+I Plan

- PROFIT: Promotion of RTD projects in business sector (Industry leadership plus PRI participation)
- CENIT:
  - Consortiums: industry and PRI
  - Ambitious goals
  - Budget: 10..20 M€, 4 years
  - PRI, at least a 25%





- **ICT Research in Spain:  
Organization**





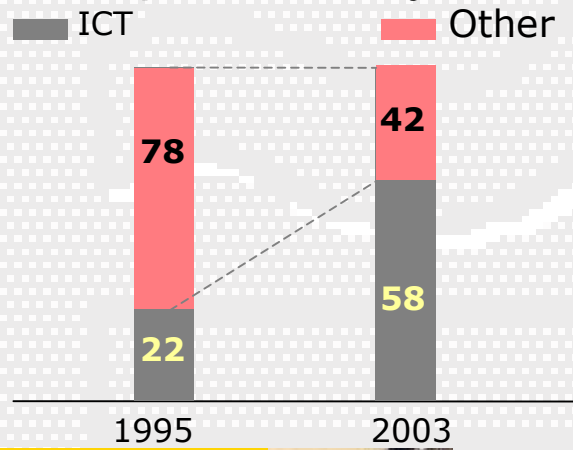
# ICT importance in the world

**ICT market in the world:** around 300 billion €

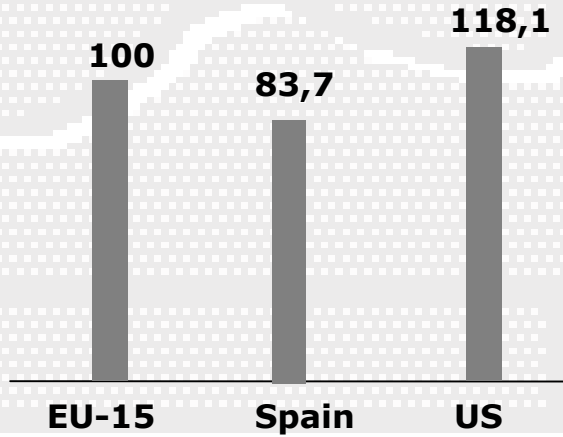
**Europe:** 1/3 of this market, around 8% of GPB

**Spain:** around 83 M€, 4.5% of GPB

Industries bet for their digital conversion, and ICT is the key.  
 One of the main sources of economic growth, significant impact on productivity



Relative



Source: EIU; European Commission; Groningen Growth, Eurostat





# ICT Research

- ICT has a significant importance in all research plans along the world.
  - USA 32%
  - Japan 30%
  - EU, Programme Framework 28%
  - Germany 24%
  - Scandinavia 20%
  - Spain 11.6%
- Relation EU/USA: 1:2.5
- In research budget: 1:2







# Spanish Research Plan (2004-2007): Information Society Technologies Area

- *Information Society technologies as:*
  - *Power of economy*
  - *Provision of useful services for the public society*
- *National Programme on Informatics Technologies (Computer Science)*
- *National Programme on Communications and Electronics Technologies*
- *National Programme on Technologies for Services for the Information Society*
- *Strategic action on Digital Security*





# National Programme: IST area

The National Programme on the IST area invests more than 40 millions Euro every year:

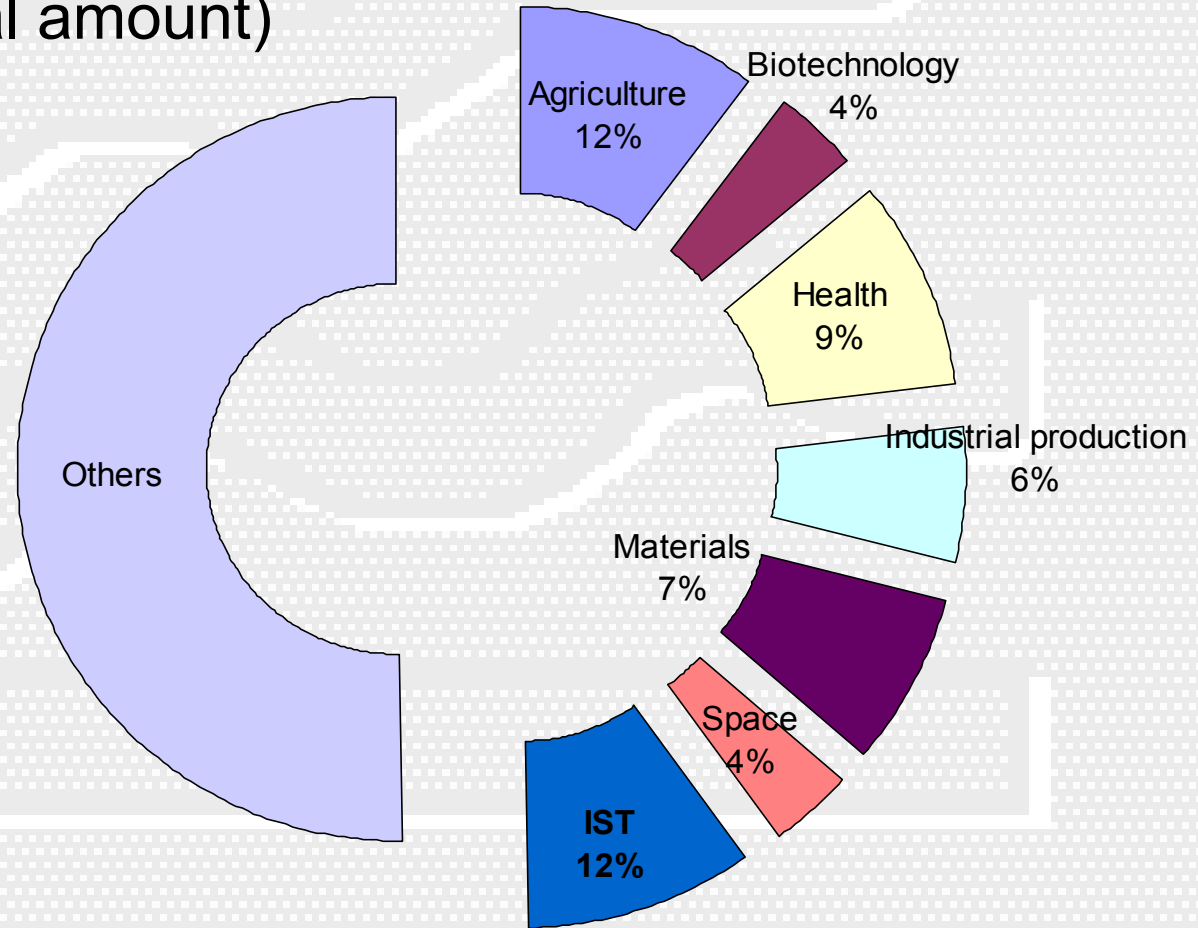
- High quality research projects
- Special actions for specific needs (scientific meetings, research networks, EU proposals, infrastructure, etc.)





# National Programme: IST area

Funding for national programmes  
(in percentage of total amount)





# National Programme on Informatics (TIN)

Main goals:

To promote basic and applied research in the Computer Science area

Generation of new scientific and technical knowledge

Technological innovations that allow an easy penetration of new technologies in the everyday life, and form the basis future economic development in Spain.





# Programme TIN

Global goals:

*Software and Hardware Technologies for the tomorrow's Information Society*

- Construction of software of high quality and reliable in a productive way
- Computer based solution for the Ambient Intelligence vision of the EU

• A budget of around 13 M€ per year





# Programme TIN

## Scientific and Technological Priorities:

- Software development and support technologies
- Software Engineering
- Information Management
- High Performance Computing
- Open and Distributed Systems
- Intelligent Systems
- Advanced interfaces





# Programme TIN

- *Software Engineering*: Requirements engineering, reliability, software architectures, ...
- *Software Development Tools*: New programming languages, new computational models, ...
- *Intelligent systems*: Agents, soft-computing, data mining, speech engineering, ...





# Programme TIN

- *Advanced Interfaces*: Virtual reality, image processing, multimodal interfaces, ...
- *Networked Systems*: Mobile and ubiquitous computation, web based systems, web semantics, distributed and real time systems, ...
- *High Performance Computing*: Multiprocessors, Grid computing, simulation, ...







## Strongest areas

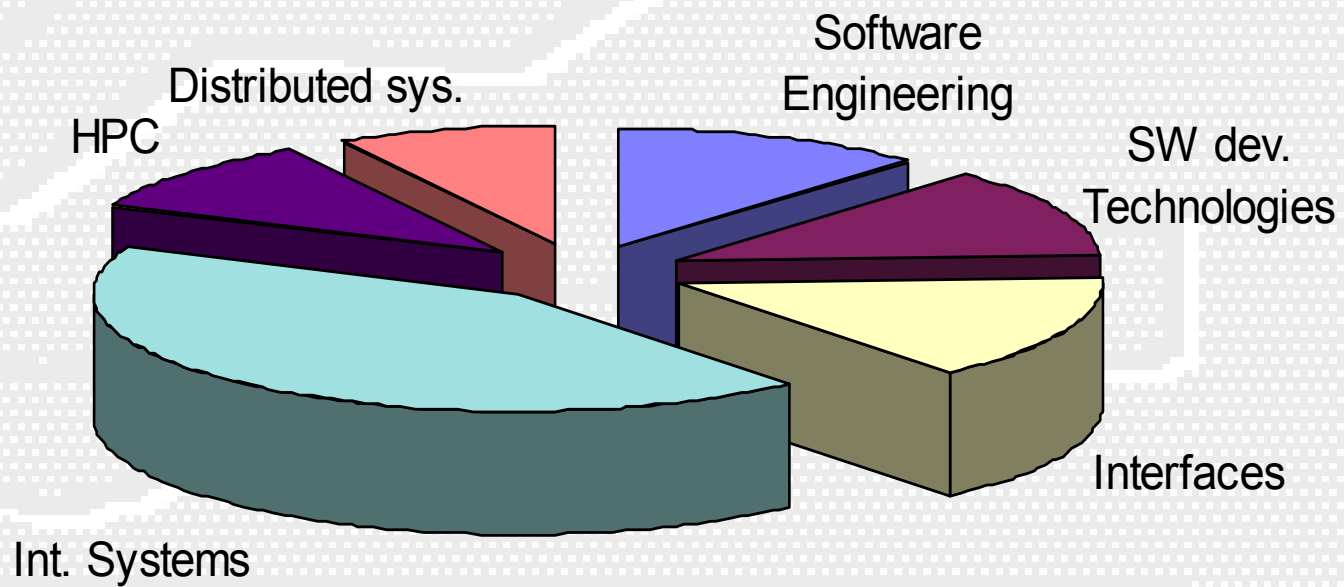
*Research is basically carried out in Universities and the Spanish Scientific Council (CSIC)*

- High Performance Computing-HPC (*UPC, UPV, U. Málaga, UCM, ...*)
- SW tools, programming languages (*UPM, UPC, UPV, U. Málaga, UCM, ...*)
- Soft-computing (*III A-CSIC, UPM, U. Granada, ...*)
- Agent technologies (*III A-CSIC, URJC, ...*)
- Advanced interfaces [Virtual reality, image processing, voice recognition] (*UPC, U. Zaragoza, UPM, UPV*)
- Databases and Software Engineering (*UPC, UPM, UPV, EHU, URJC*)





### Distribution of projects

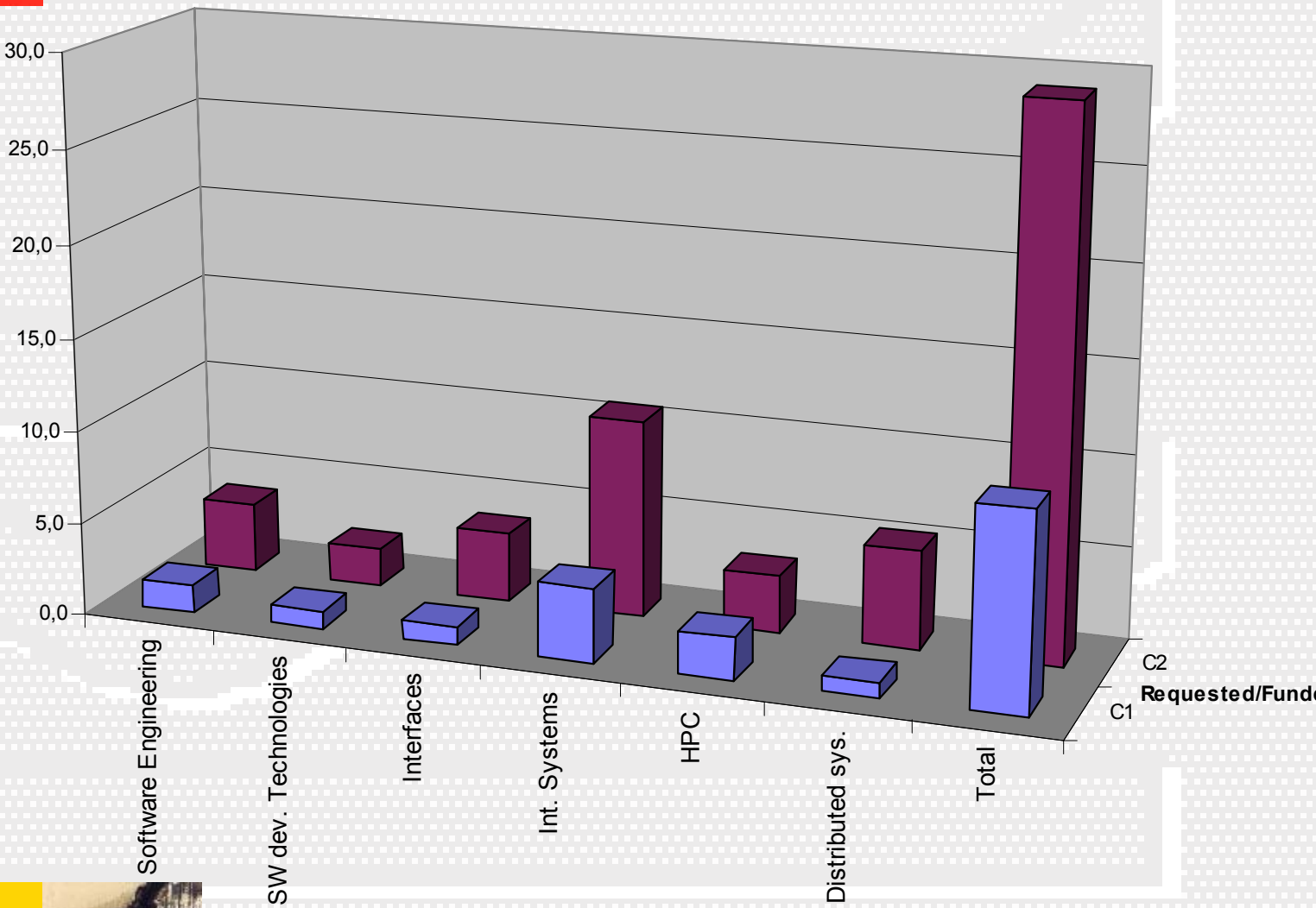


*Around 350 projects alive (≈120 per year)*





### Distribution of budget

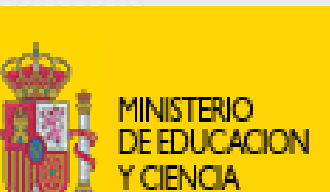


Areas





# Computer Science in Spain: Indicators and activities





## Spanish Ranking in all areas (#papers)

- |                             |                                 |
|-----------------------------|---------------------------------|
| 1 Clinical Medicine         | 12 Molecular biology & genetics |
| 2 Chemistry                 | 13 Microbiology                 |
| 3 Physics                   | 14 Space sciences               |
| 4 Plant and animal sciences | <b>15 Computer Science</b>      |
| 5 Biology and biochemistry  | 17 Geosciences                  |
| 6 Engineering               | 18 Pharmacology & Toxicology    |
| 7 Material Sciences         | 19 Psiquiatry/Psicology         |
| 8 Mathematics               | 20 Immunology                   |
| 9 Agriculture Sciences      | 21 Economy & Bussiness          |
| 10 Neuroscience             | 22 Social Sciences              |
| 11 Enviromental sciences    | 23 Multidisciplinar             |

Source:SCI Databases, March 2005





Rankings in the World

Country Ranking in CS (#papers)

- 1 USA
- 2 Germany
- 3 Japan
- 4 England
- 5 France
- 6 Italy
- 7 Canada
- 8 China
- 9 South Korea
- 10 **Spain**

CS situation in other countries

Spain:	15
USA:	16
Germany:	14
UK:	16
France:	14
Italy:	13
Netherlands:	16
Japan:	12
Israel:	12
India:	14
Finland:	13

Source:SCI Databases, March 2005





## Rankings in the World

### Country Ranking in other areas

Area	World (papers)	Spain	World (citations)	Spain
Agr. Sciences	6	1	6	1
Microbiology	7	2	9	3
Biology/Biochemistry	8	3	12	5
Env. Sciences	8	3	9	3
Plants & animal sciences	9	7	9	3
Mathematics	10	9	9	3
Physics	10	9	10	7
Chemistry	10	9	8	2
<b>Computer Science</b>	<b>10</b>	<b>12</b>	<b>12</b>	<b>11</b>
.....	...	.....	.....	.....

Source:SCI Databases, March 2005

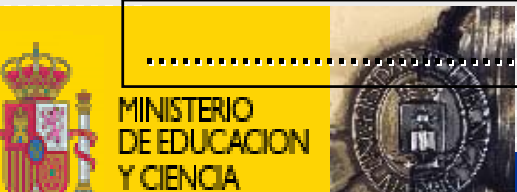




Rankings in Europe

Country Ranking in all areas (EU+Associated)

Area	EU (papers)	Spain	EU (citations)	Spain
Agr. Sciences	3 (D, F)	1	4 (UK, F, D)	1
Microbiology	4 (D, UK, F)	2	5 (D, UK, F, H)	2
Plants & animal sc.	4 (D, UK, F)	2	6 (D, UK, F, H)	8
Env. Sciences	4 (D, UK, F)	2	5 (UK,D,F,N)	2
<b>Computer Science</b>	<b>5 (D, UK, F, I)</b>	<b>5</b>	<b>5 (UK, D, F, H)</b>	<b>8</b>
Mathematics	5(F,D, [Russia],UK,I)	5	5 (F, D, UK, I)	2
Biology/Biochemistry	5 (D, UK, F, I)	5	8 (UK,D,F,I,CH,SW,H)	13
Physics	5(D,F,[Russia],UK,F,I)	5	6 (D,F,UK,[Russia]I,CH)	8
Chemistry	5 (D, UK, F, I)	5	5 (D, UK, F, I)	2
.....	...	.....	.....	.....



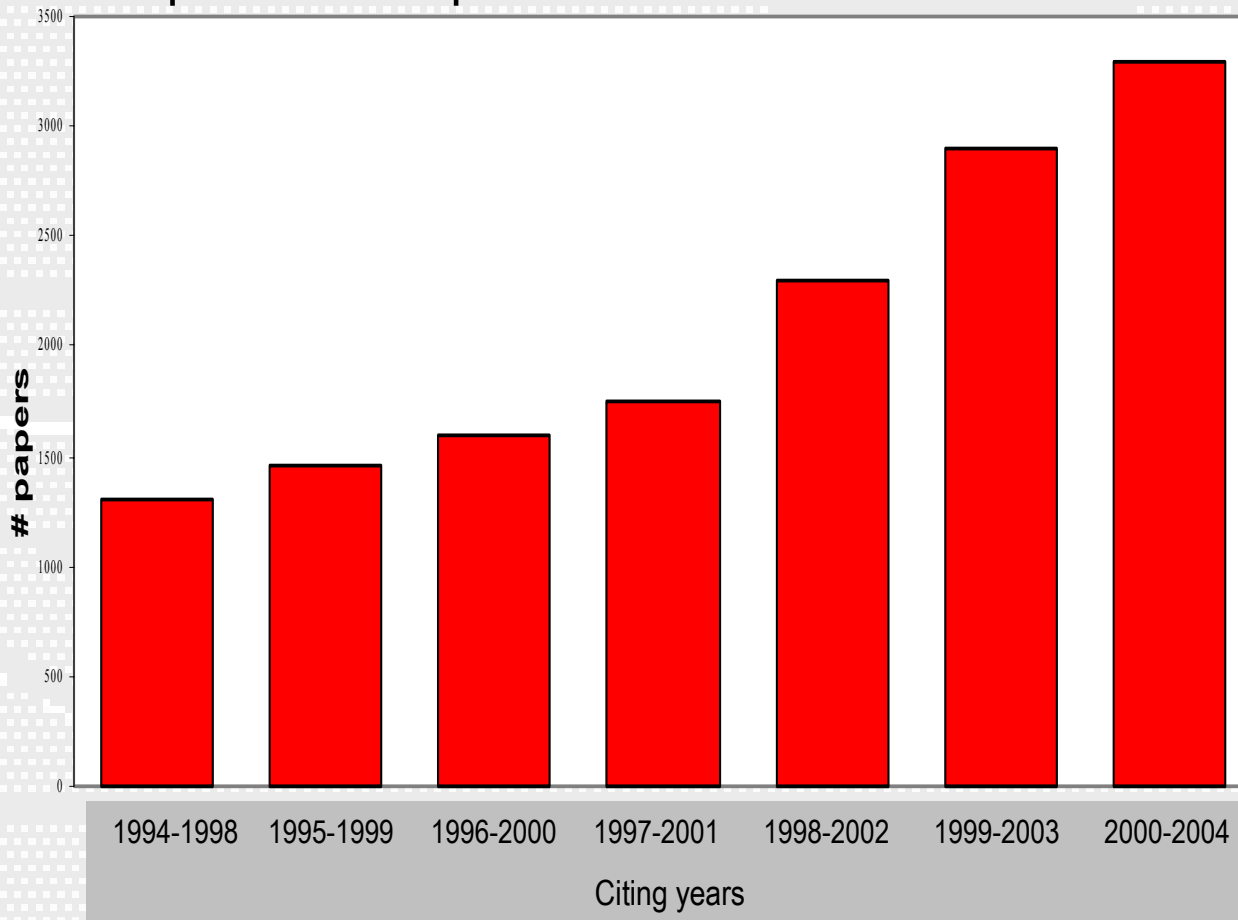
Source:SCI Databases, March 2005



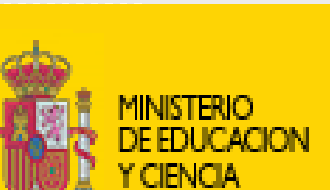


## SCIENTIFIC PRODUCTION

### #Papers in Computer Science- Evolution



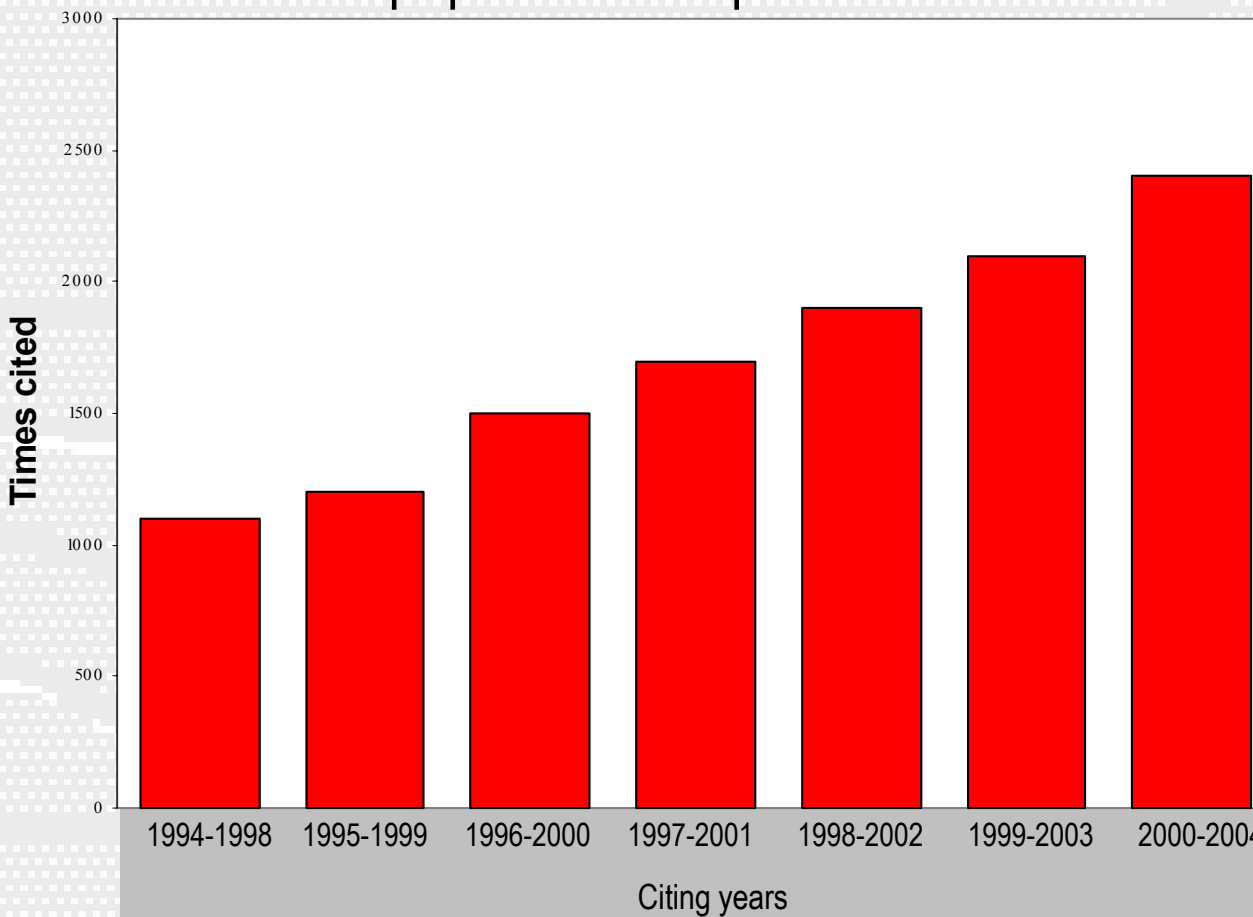
Source:SCI Databases, March 2005



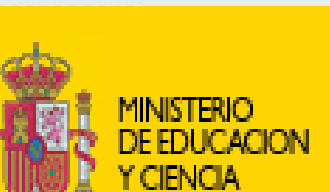


## SCIENTIFIC PRODUCTION

### #Citation of papers in Computer Science- Evolution



Source:SCI Databases, March 2005





# Indicators

- Computer Science on average. **No area stands up significantly over others.**
- Good position in Europe.
- Significant improvements in the last years:
  - World ranking (gain of 5 positions in the last 5 years)
- A discipline with just 26 years old in Spain in the university education.
- Additional technology transfer duties.
- ISI is not the best indicator for CS: preference to Conferences.
- See also Citeseer: [citeseer.ist.psu.edu](http://citeseer.ist.psu.edu), includes conference papers
  - They publish a ranking of most cited researchers:  
32 spanish researchers among the first 10000





# Good health of CS in Spain

Recently we have organized the 1<sup>st</sup> Spanish Conference on Informatics

**CEDI 2005**

I CONGRESO ESPAÑOL DE INFORMÁTICA  
Nuevos retos científicos y tecnológicos en Ingeniería Informática

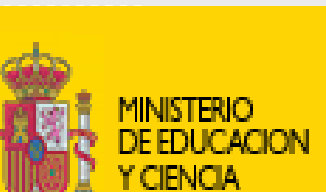
**GRANADA** DEL 13 AL 16 DE SEPTIEMBRE

PALACIO DE EXPOSICIONES Y CONGRESOS DE GRANADA



A big success:

- 1700 attendees
- 27 symposiums in parallel
- 1200 communications
- 23 invited talks





# Spanish Conference on Informatic







# Informatics National Awards





# European Dimension





# European Dimension

## International programmes:

- ESA, CERN, ESO-ENO, GBIF
- European Science Foundation (EUROCORES, COST, ...)
- ERA and the VI Framework RTD Programme
- EUREKA and EUREKA Clusters (CELTIC, ITEA, MEDEA)
- Educational programmes (Erasmus Mundus)







# 6<sup>th</sup> PROGRAMME FRAMEWORK



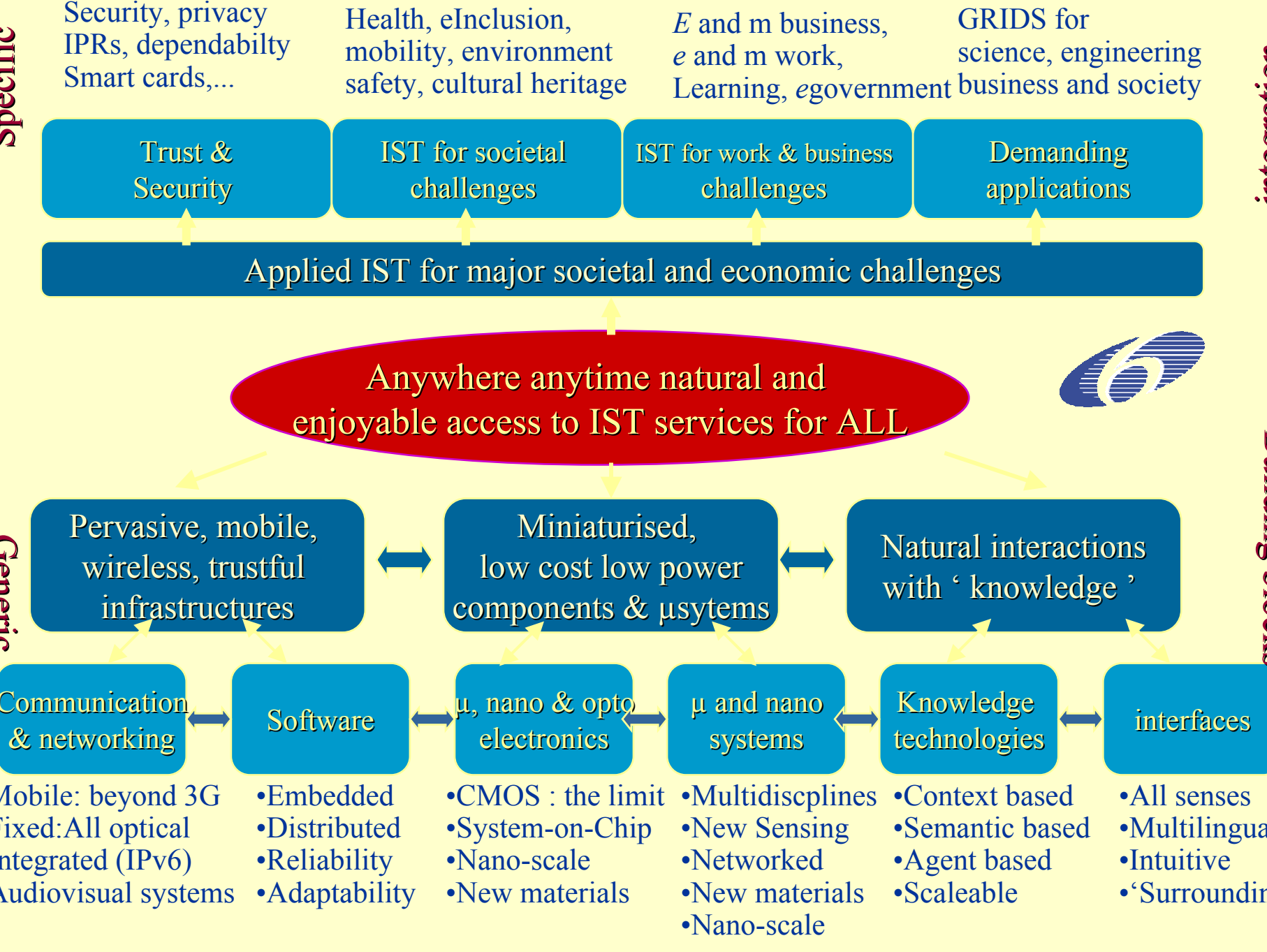
INTEGRATING EUROPEAN RESEARCH								
PRIORITY THEMATIC AREAS						ANTICIPATING S/T NEEDS		
Genomic and biotechnology for health	Information society technologies	Nanotechnologies, intelligent mat., new production processes	Aeronautics and space	Food safety and health risks	Sustainable development and global change	Citizens and governance in the knowledge society	Research for policy support	Frontier research, unexpected developments
	Specific SME activities							
	Specific international cooperation activities							
	JRC activities							

3600 M€

STRUCTURING THE ERA			
Research and innovation	Human resources & mobility	Research infrastructures	Science and society

STRENGTHENING THE FOUNDATIONS OF ERA	
Coordination of research activities	Development of research/innovation policies







# Strategic objectives



## Calls 1, 4

## Call 2, 5

1. Pushing the limits of CMOS
2. Micro & nano-systems
3. Broadband access for All
4. Mobile & wireless systems beyond 3G
5. Towards a global dependability & security framework
6. Multimodal interfaces
7. Semantic-based knowledge systems
8. Networked audiovisual systems & home platforms
9. Networked business & government
10. eSafety for road and air transport
11. eHealth
12. Technology-enhanced learning & access to cultural heritage
13. FET proactive

*Technology components*

*Integrated systems*

*Aplicacion*

1. Advanced displays
2. Optical, opto-electronic, photonic functional components
3. Open development platforms for software and services
4. Cognitive systems
5. Embedded systems
6. Applications & services for the mobile user & worker
7. Cross-media content for leisure and entertainment
8. GRID-based Systems & solving complex problems
9. Improving Risk management
10. eInclusion
11. Product & services engineering 2010 (joint with priority 3)
12. Research Networking test-beds





# Current state of PF6

- 5 calls launched
  - 2 groups of topics on 2 calls
  - One on additional activities (f.i. Int. cooperation)
- 2 fully contracted
- 2 pending of formal approval
- 1 under evaluation
- INCO action: Allows third countries to participate in projects (in particular India)





# Global results



Total results of the first two calls

Total Budget (k€)	Assigned to Spain	Percentage return	Percentage Sp contribution
1.532.076	98.063	6,8%	6,5%





# Global results



	Proposals with Spanish participation	Total proposals 1st call	%
<b>TOTAL</b>	<b>116</b>	<b>227</b>	<b>51,10%</b>
IP	45	64	70,31%
NoE	25	33	75,76%
STREP	37	96	38,54%
SSA	4	23	17,39%
CA	5	11	45,45%





# Results per topic



Objective	R (%)	R (M€)
Broadband	14,5	12,3
Mobile	7,4	8,2
Security	6,2	4,7
Semantic web	8,7	6,4
e-learning	2,1	1,9
Interfaces	6,2	4,6
Software	8,1	5,2
Embedded	4,0	2,3
Grid	6,0	5,3
FET	4,7	2,3
Total	6,8	98

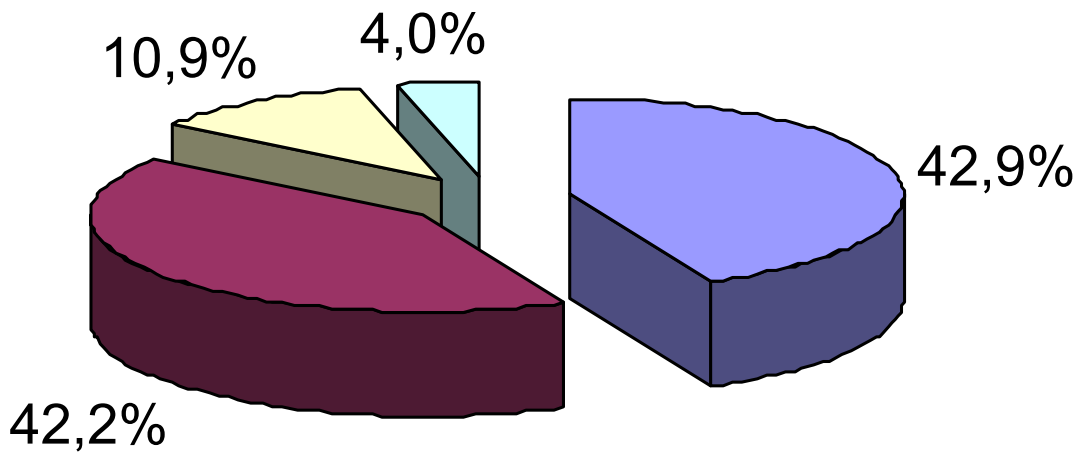




# Distribution of budget (SP)



Provisional distribution of Spanish return

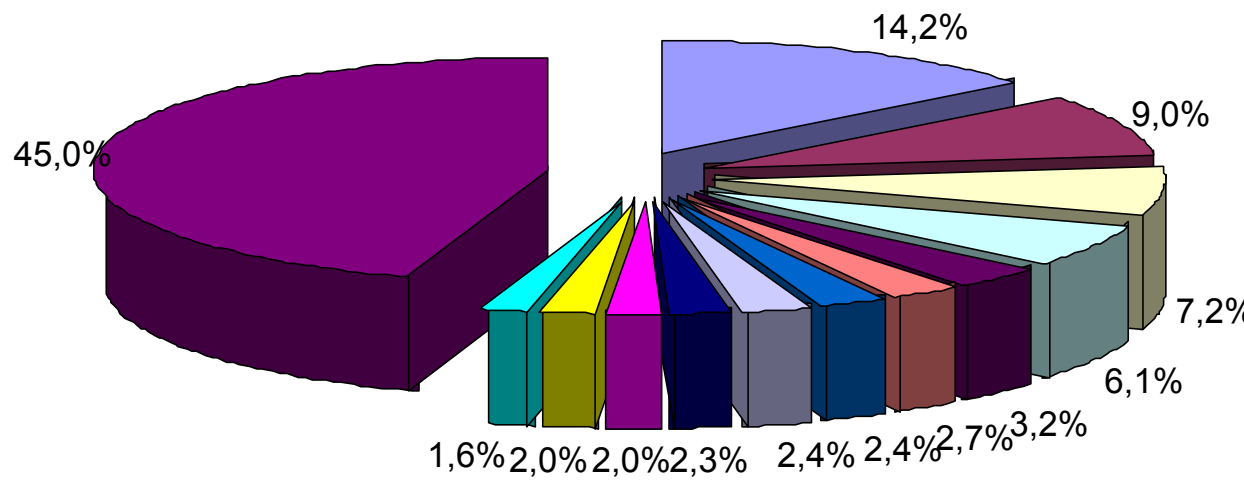


- INDUSTRY (IND)
- UNIVERSITY (HE)
- RESEACH CENTERS (RES)
- OTHERS (OTH)





# Main actors



Telefónica	UPC
UPM	UPV
UC3M	UPF
ATOS	CSIC
UB	DS2
Iberdrola	ISOCO
Others)	





# EUREKA

- Industry oriented projects on the IST area
- 3 clusters, managed by a board of companies:
  - MEDEA, on microsystems
  - CELTIC, on communications
  - ITEA, on software intensive systems
- Excellent Spanish participation:
  - On ITEA, Spain is the second in the rank of participation/budget.





# Towards the 7th Programme Framework

- Initial design under discussion
- Main ideas:
  - Enforcing the European Research Area (ERA) and the coordination of policies along Europe
  - Involved of industry on research planification (European technological platforms ETPs)
  - Creation of the European Research Council (ERC)
    - 5+2+2 axes

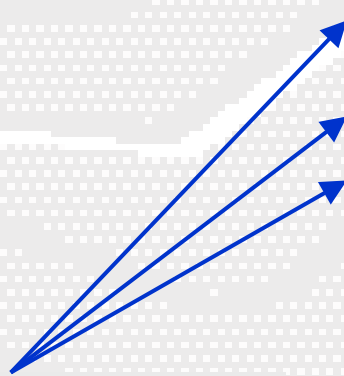




# Structure of the 7th PF

## 5 first axes:

- 1°.- Individual research teams (ERC).
- 2°.- Research capacities.
- 3°.- Private/public partnerships (ETPs).
- 4°.- Networking and collaboration.
- 5°.- Co-ordination of national and regional research programmes and policies.



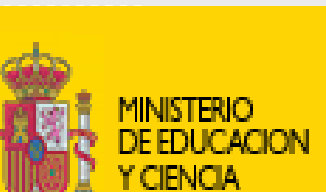
*Similar to 6thPM*

- 6°.- Space
- 7°.- Security

## 2 more axes:

- 8°.- Innovation
- 9°.- International cooperation

## and 2 more:



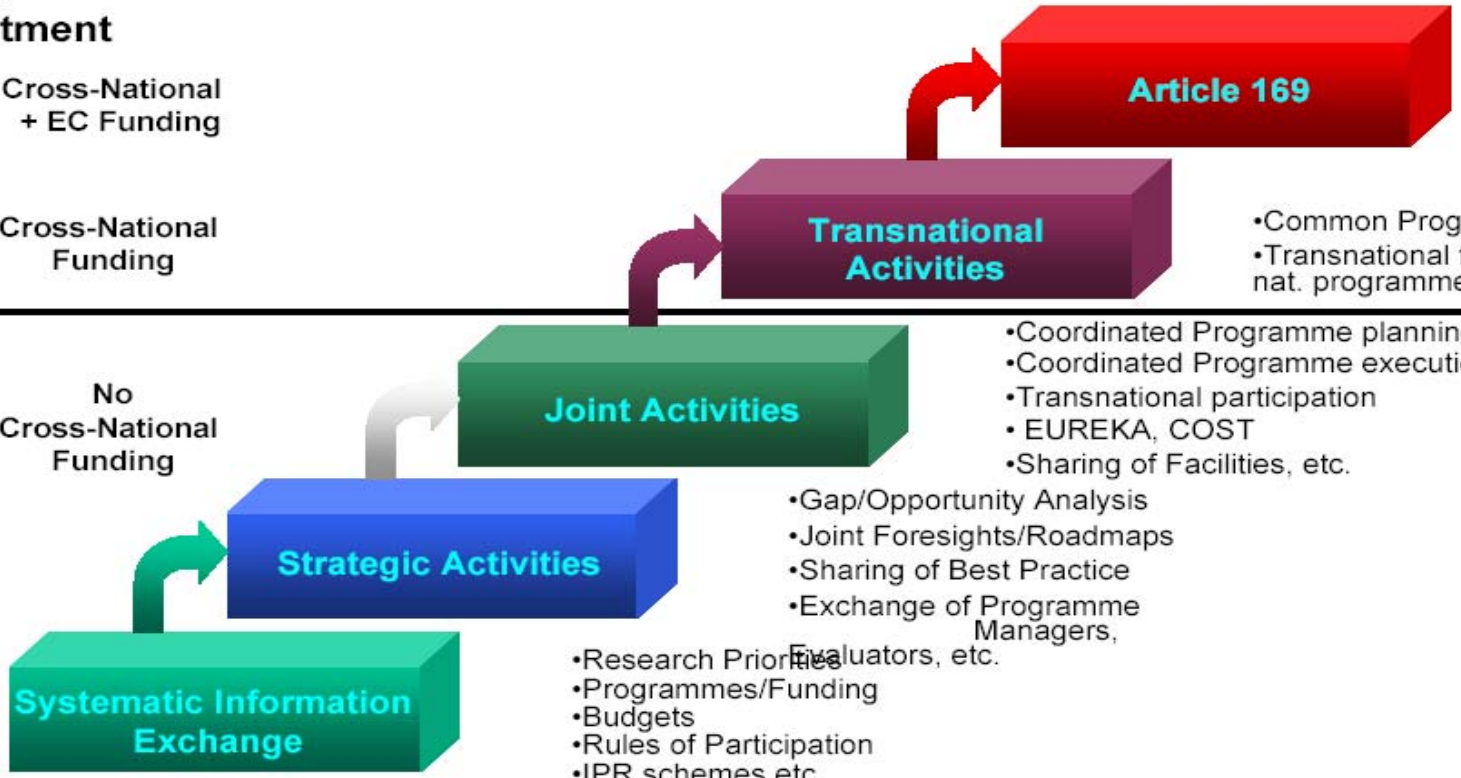
# Steps towards ERA Coordination

Level of Commitment

Cross-National + EC Funding

Cross-National Funding

No Cross-National Funding



- Common Programmes
- Transnational funding nat. programmes, ESF

- Coordinated Programme planning
- Coordinated Programme execution
- Transnational participation
- EUREKA, COST
- Sharing of Facilities, etc.

- Gap/Opportunity Analysis
- Joint Foresights/Roadmaps
- Sharing of Best Practice
- Exchange of Programme Managers, Evaluators, etc.

- Research Priorities
- Programmes/Funding
- Budgets
- Rules of Participation
- IPR schemes etc.

- European + National Programmes
- Variable Geometry





# TECHNOLOGICAL PLATFORMS

## A new way to implement the Lisbon Strategy

Private/public partnerships

A leading group of companies in a given field defining a shared vision

Allow industry to take the initiative

Common research agenda

With connections with the EU, governments, other sources of funding

Usually organized in a steering committee (leading industries), a scientific board, and a mirror groups (governments)





## 26 PROPOSED ETPs

### Strategic goals

### PLATFORMS

Sustainable development

PLANTS FOR THE FUTURE; WATER SUPPLY AND SANITATION (WSSTP)  
 PHOTOVOLTAICS; SUSTAINABLE CHEMISTRY; GLOBAL ANIMAL HEALTH  
 ROAD TRANSPORT RESEARCH ADVISORY COUNCIL (ERTRAC)  
 RAIL RESEARCH ADVISORY COUNCIL (ERRAC); WATERBORNE TP  
 GAS COOLED REACTORS TECHNOLOGY PLATFORMS\*  
 SUSTAINABLE BENEFITS FROM RENEWABLE FORESTRY RESOURCES  
 Clean and Sustainable Carbon-based Energies for Europe (NEU-CARBEN)\*  
 CLEAN POWER\*

New technologies

HYDROGEN AND FUEL CELLS (HFP)  
 EUROPEAN NANOELECTRONICS INITIATIVE ADVISORY COUNCIL (ENIAC)  
 NANOMEDICINE (Nanobiotechnologies for Medical Applications)\*

Technological advances

EMBEDDED SYSTEMS (ARTEMIS)  
 ADVISORY COUNCIL FOR AERONAUTICS RESEARCH IN EUROPE (ACARE)  
 EUROPEAN SPACE TECHNOLOGY PLATFORM (ESTP)

Public services based on new technologies

MOBILE AND WIRELESS COMMUNICATIONS (eMobility)  
 INNOVATIVE MEDICINES FOR EUROPE  
 NETWORKED EU. SOFTWARE AND SERVICES (NESSI)

New technologies applied to traditional sectors

STEEL  
 FUTURE TEXTILES AND CLOTHING (ETP-FTC)  
 MANUFACTURE - Future Manufacturing Technologies  
 CONSTRUCTION TECHNOLOGY (ECTP)





# ETPs in IST

**Networked European Software & Services**



**Innitiative**

**ENIAC**

EUROPEAN NANOELECTRONICS INITIATIVE ADVISORY COUNCIL



**EUropean RObotics Platform**

**NEM**


Networked and Electronic Media

Audiovisual and contents

**eMobility**

**Mobile and Wireless Communications Technology Platform**

**ARTEMIS**



ADVANCED RESEARCH AND DEVELOPMENT ON EMBEDDED INTELLIGENT SYSTEMS







## ***RENACE:*** **(Redes de Cooperación Científico Tecnológicas)** **Scientific-Technological Cooperation Networks**

- Key engine elements for national R+D activities
- Define strategic agendas with a long term vision (but also with short and medium term goals)
- To establish groups of excellence and scientific-technological coordination in priority areas of the IST area (european and national level).
- Promote the cooperation and coordination between Spanish and European activities.
- Proposing and creating significant infrastructures.





# Goals

- Promote the evidence of the benefit of the technological development to the social, economic and political objectives.
- Acting as an intermediate entity:
  - representing the Spanish interest,
  - giving answers to the recommendations and actions of the ETP,
  - contributing to the dissemination of results.
- Promote public/private consortiums and strategic projects (CENIT).
- Developing a research plan
- Developing a training and educational programme

## In other words

≈ Spanish Technological Platforms: a place to discuss, make proposals to the Administration, organize key actions, ...

Help to ensure and adequate Spanish presence in the launching of ETPs.

Cooperate in the Spanish participation in ERA Nets/Pilots.





Plataforma Tecnológica Española de Tecnologías Audiovisuales en red



PLATAFORMA TECNOLÓGICA ESPAÑOLA DE TECNOLOGÍAS PARA SEGURIDAD Y CONFIANZA



# INES

Iniciativa Española de  
Software y Servicios



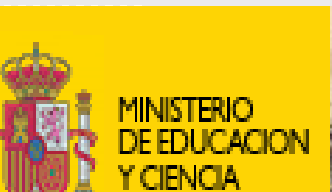
Plataforma Tecnológica Española de Comunicaciones Inalámbricas





# Erasmus Mundus

- An European Programme for accreditation of special quality Master Courses
- Reinforces European cooperation in Higher Education.
- Provides grants for third countries students.
- Doble degree agreements: The student splits the stay in 2 countries, and holds two degrees.
- Spain in the second country in getting accreditations
- Just an example: International Master in Computational that we are running at UPM





# European Master in Computational Logic



- Provide students with the theoretical and practical preparation required for advanced and rigorous software development using computational logic, declarative technology and formal methods
- Erasmus Mundus accreditation in 2003. 20 grants offered since this.
- Based on a double degree agreement between the partners.
- Duration: 2 years      • Start: Each Winter semester
- Language: English      • Lecturers: Top international experts

<http://www.fi.upm.es/master/cl>

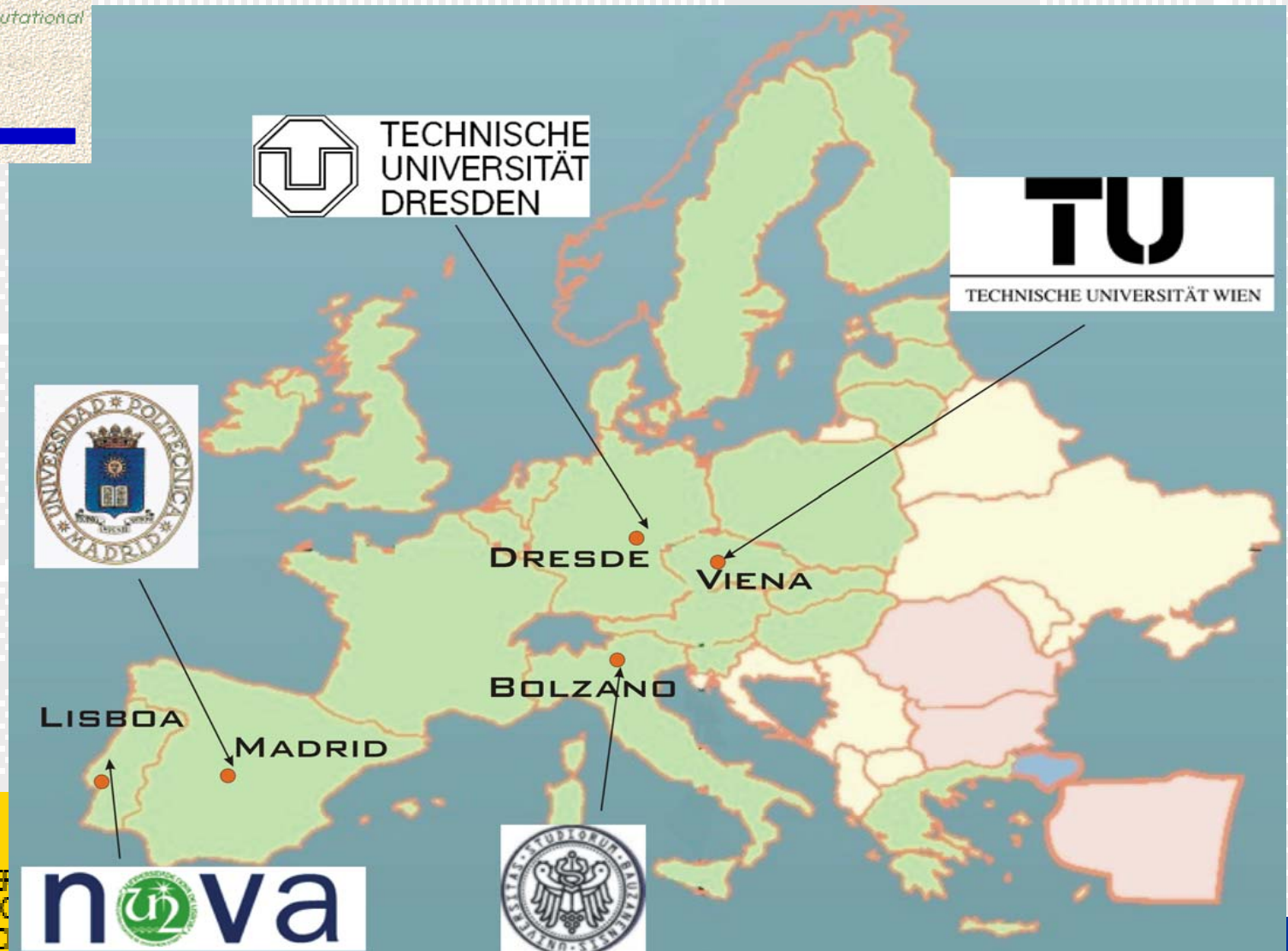
<http://european.computational-logic.org/>







# Partners





# Contacts

- Ministry of Science and Education [www.mec.es](http://www.mec.es)
- European Commission, 6PF, IST [www.cordis.lu/ist](http://www.cordis.lu/ist)
- Spanish Conference on Informatics [www.cedi.ugr.es](http://www.cedi.ugr.es)
- Erasmus Mundus [europa.eu.int/comm/education/programmes/mundus/index\\_en.html](http://europa.eu.int/comm/education/programmes/mundus/index_en.html)

*Thank you for your attention*

