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Sanderson Leitão, Ph.D

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1.Administrative Framework and Brief Overview of S&T policy

Some numbers on Brazil

Total area	8.5 million km²
Population	201 million (2013)
GDP (2010)	3,7 US$ trillion
Investment in R&D	1.16 % GDP in 2010
Scientists and researchers	232,000 in 2010 *(headcount)*
Scientific papers	2.7 % of world scientific production

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1.Administrative Framework and Brief Overview of S&T policy. *Some numbers on Brazil (cont.)*

BRAZIL

Federative Republic

26 States
01 Federal District
5.561 Municipalities (*)

5 Regions
- North
- Northeast
- Southeast
- Center west
- South

(*) CENSUS 2000 - IBGE

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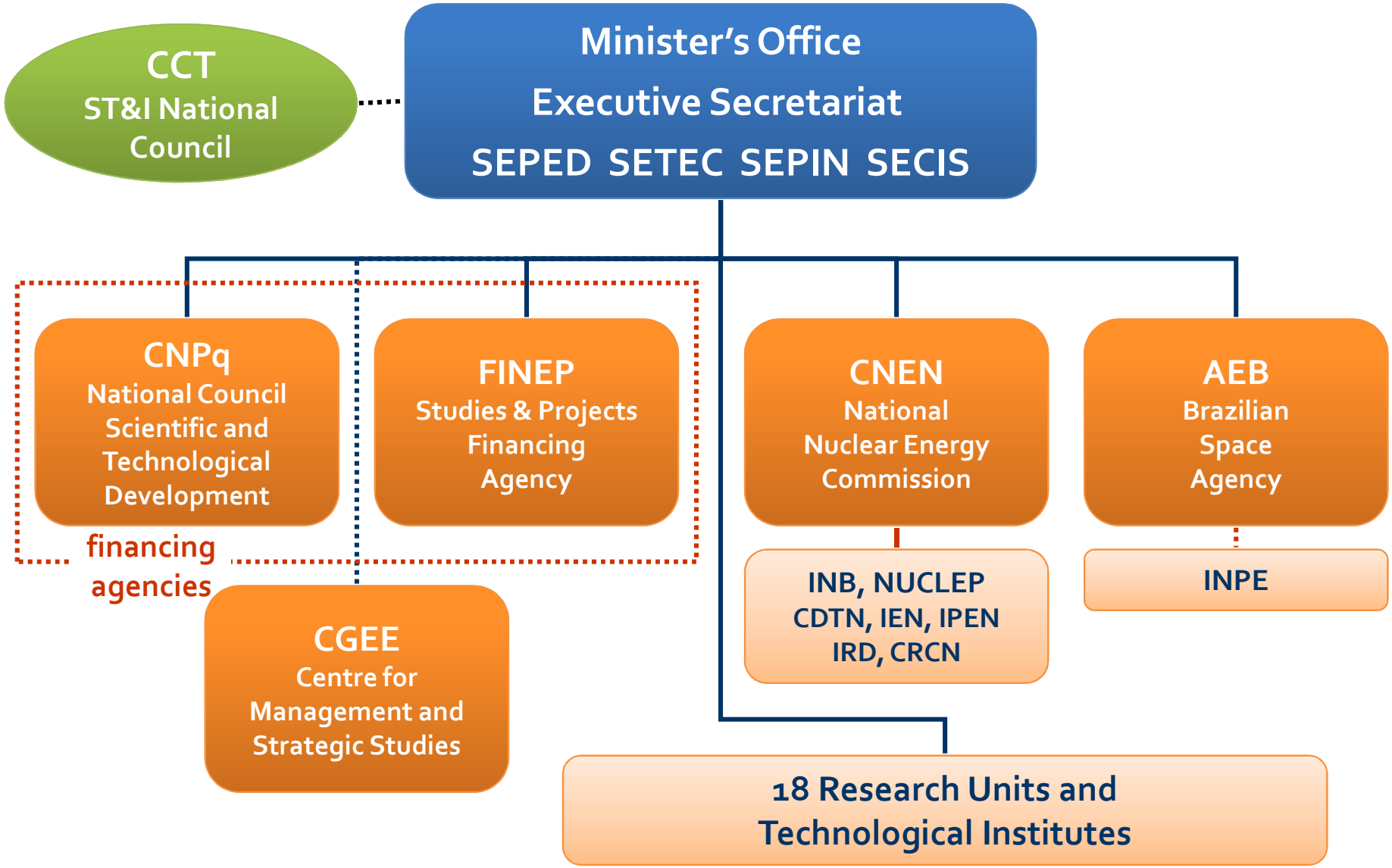

1.2 Brief Overview of S&T policy

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2. Action Plan and law on S&T

2.1. Overview of past S&T policy

2007 – 2010 Action Plan
Science, Technology and Innovation
for National Development

Main Results and Advances
2007 - 2010

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Action Plan in S,T&I 2007-2010: 4 priority axes, 21 lines of action, 87 programs

I. Expansion and Consolidation of National S,T&I System

- Interaction with states, international cooperation
- CNPq e CAPES grants, National Institutes, Pronex, Proinfra, RNP

II. Promotion of Technological Innovation at Enterprises

- States' innovation laws, fiscal incentives,
- Federal Innovation Law: grants for R,D&I at enterprises
- FINEP credit operations, venture capital
- SIBRATEC

III. R,D&I in Strategic Areas

- Biotechnology, Nanotechnology, Health
- Information and Communication Technology
- Biodiversity and Natural Resources, Amazon
- Meteorology and Climate Change, Energy
- Nuclear Program, Space Program, Defense

IV. S,T&I for Social Development

- Brazilian Olympic Competition on Mathematics for Public Schools (OBMEP)
- National S,T&I Week
- Technological Vocational Centres

232.000 Researchers (headcount)

- 83.000 Ph.D. degree holders
- 101.000 Master's degree holders
- 48.000 other, which correspond to

137.000 Full time equivalent researchers

- 46.000 Ph.D. degree holders
- 53.000 Master's degree holders
- 37.000 other

173.400 Postgraduate students

- 64.600 Ph.D. programmes
- 108.800 Master's programmes

50.900 Degrees awarded

- 11.300 Ph.D.
- 39.600 Master's

1,78 million CVs on Platform Lattes (august/2011)

- 374.295 CVs with at least one article published
- 7.892 CVs with registered patent

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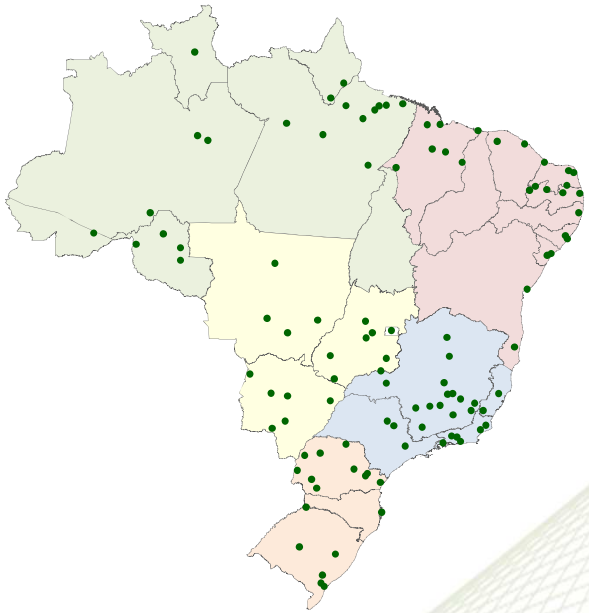
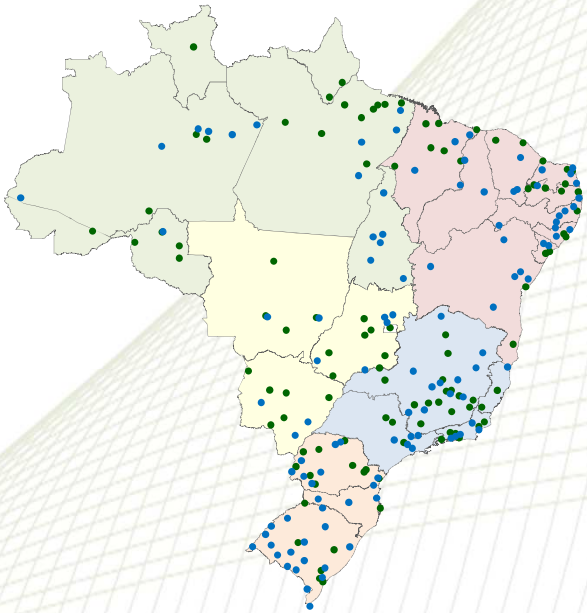
Federal Universities (public)



2002

Main campi: **43**

Other campi: **148**



2010

Main campi: **59**

Other campi: **274**

2014 *(estimate)*

Main campi: **63**

Other campi: **321**

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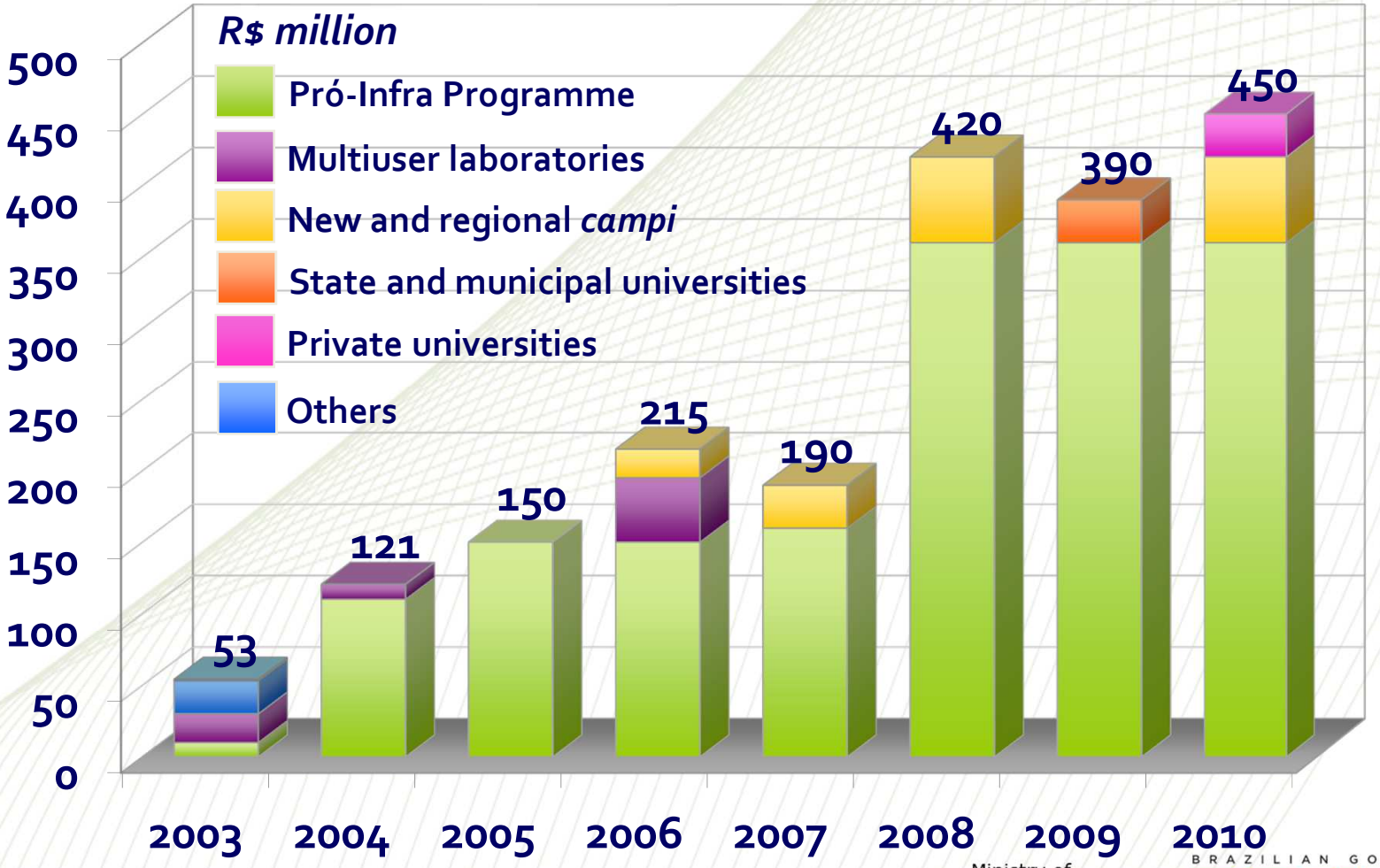
FINEP
FINANCIADORA DE ESTUDOS E PROJETOS

Support for the Implementation of Research Infrastructure Programs

Total Funds for Project Calls in 2010: R$ 450 millions ~US$ 250 millions



Source: FINEP/MCTI

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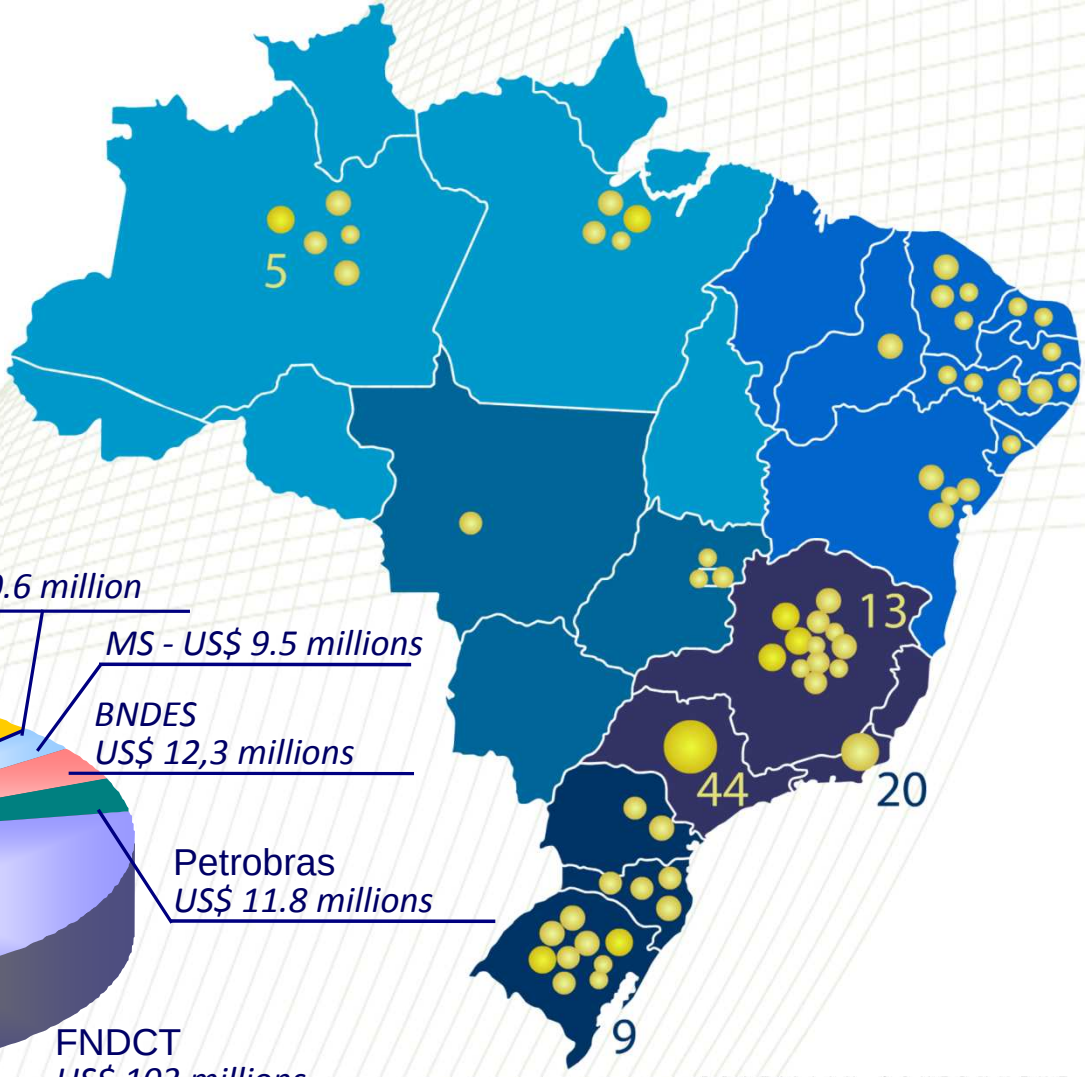
CNPq
Conselho Nacional de Desenvolvimento Científico e Tecnológico

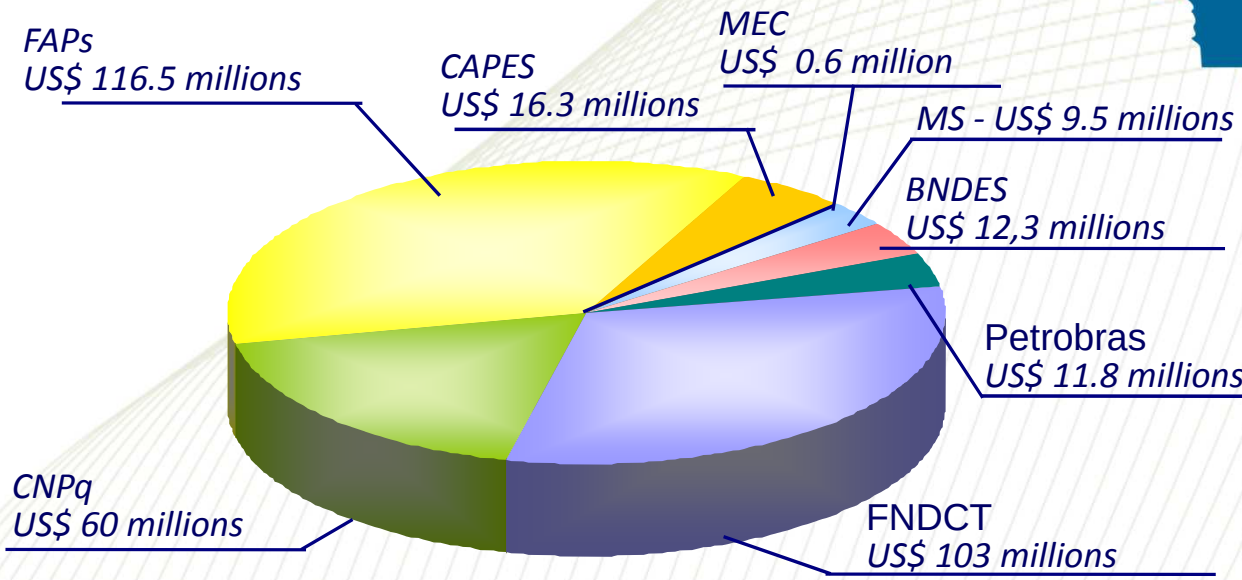
INCT – National Institutes of Science and Technology

122

inct
national institutes of
science and technology



US$ 330 million



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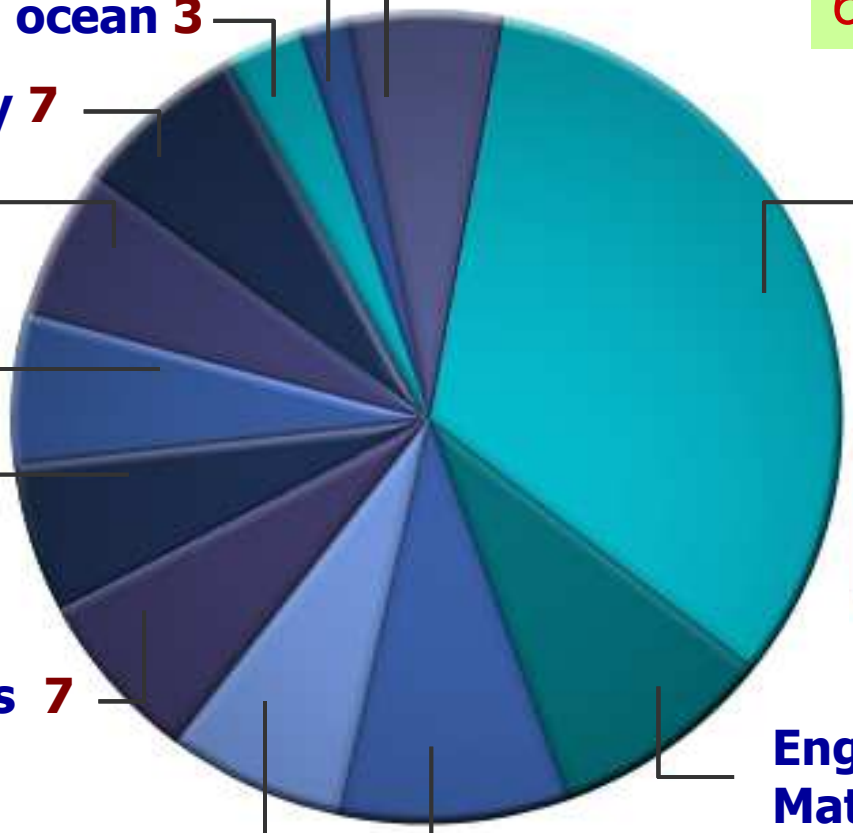
CNPq
Conselho Nacional de Desenvolvimento Científico e Tecnológico

Areas of knowledge - INCTs



6,250 researchers

122

inct
national institutes of science and technology

2.1. Overview of past S&T policy

Legal Framework

Innovation Law – Law no. 10.973, 02.12.2004
regulated by Decree no. 5.563, 11.10.2005

Enterprises Law (Lei do Bem) – Law no. 11.196, 21.11.2005 (fiscal incentives/tax credits), regulated by Decree no. 5.798, 07.06.2006 altered by Law no. 11.487, 15.06.2007

Information Technology Law – Law no.8.248, 23.10.1991
improved by Law no. 11.077, 30.12.2004

Law no. 11.484, 31.05.2007
incentives to industry (digital TV equipment and semiconductor electronic components)

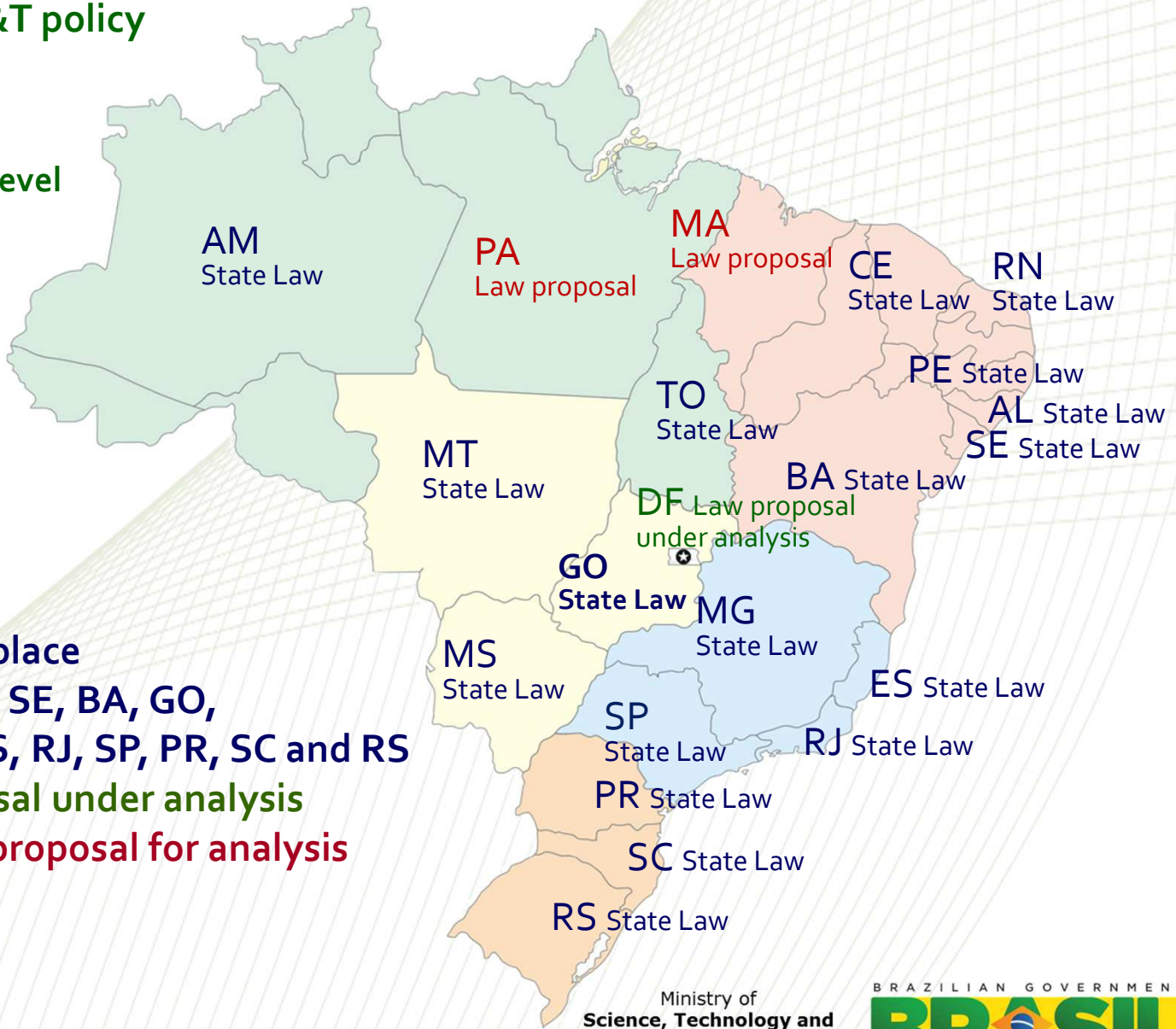
Biosafety Law – Law no. 11.105, 24.03.2005
regulanted by Decree no. 5.591, 22.11.2005

Access to Biodiversity Law Proposal - text under government analysis, prior to Congress analysis and approval

2.1. Overview of past S&T policy

LEGAL FRAMEWORK

Innovation Laws at State Level



18 states with laws in place
AM, CE, RN, PE, AL, SE, BA, GO, MT, MS, TO, MG, ES, RJ, SP, PR, SC and RS

1 state with law proposal under analysis

2 states prepared law proposal for analysis

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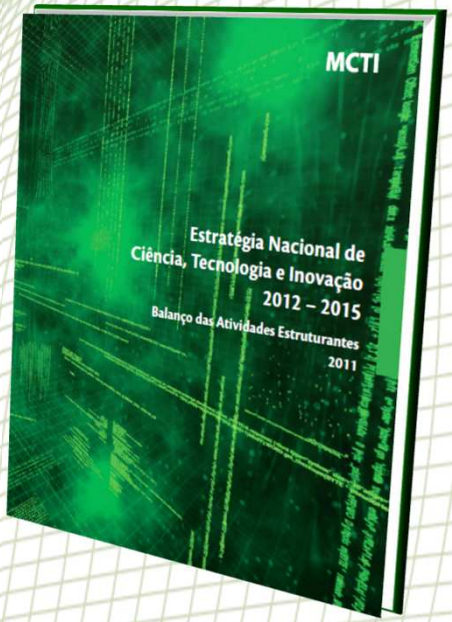
2.1. Overview of past S&T policy

Main advances from 2003 to 2010

- ✓ *ST&I: a matter of State*
- ✓ *ST&I policy focused on four strategic lines*
- ✓ *new regulation for innovation*
- ✓ *new instruments and mechanisms for financing R&D*
- ✓ *increased federal funds for S,T&I*
- ✓ *greater dialogue with states, main municipalities, scientific and enterprises associations; society in general*
- ✓ *improvement and expansion of existing S,T&I programs and creation of new ones*

2.2. Country S&T policy and current action plan

2012 – 2015 National Strategy for
Science, Technology and Innovation



National Strategy for Science, Technology and Innovation

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Overview of S&T National Strategy

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2.2. Country S&T policy and current action plan

Strategic Map

Sustainable Development

S,T&I as the structuring axis of development in Brazil

Facing challenges

- Reduction of scientific and technological gap that still separates Brazil from more developed nations
- Expansion and consolidation of Brazilian leadership in the natural knowledge economy
- Expansion of the basis for environmental sustainability and developing a low carbon economy
- Consolidation of the new pattern of Brazil's international insertion
- Overcoming poverty and reducing social and regional inequalities

Strengthening of Support Basis of the S,T & I Policy

- Promotion of Innovation
- Human Resources capacity building
- Strengthening of scientific and technological research and infrastructure

Improvement of the Instruments of S,T & I Policy

- Improvement of the regulatory framework to promote innovation
- Improvement and expansion of the financing structure of the scientific and technological development
- Strengthening the S,T & I National System

Main Goals for 2014

1. Raise national expenditure on R & D

R&D/GDP

Goal 2014: 1.80%

Position 2010: 1.16%

2. Raise business expenditure on R & D
(shared with Plano Brasil Maior)

Business R&D/GDP

Goal 2014: 0.90%

Position 2010: 0.55%

3. Raise innovation rate

Goal 2014: 48.6%

Position 2008: 38.6 % (PINTEC)

4. Increase number of companies doing continuous R&D

Goal 2014: 5,000 companies

Position 2008: 3,425 companies (PINTEC, excluding R&D government institutions)

3. National S&T main issue

Core Strategy of country of R&D and the main technology focus
Issues and challenges for S&T development focusing on Green Economy

Priority Programs

- **ICT – Information and Communications Technology**
- **Pharmaceuticals and Health Industrial Complex**
- **Oil and Gas**
- **Defense Industrial Complex**
- **Aerospace**
- Nuclear
- Frontiers for innovation
  - Biotechnology
  - Nanotechnology

- **Fostering of Green Economy**
  - **Renewable Energies**
  - Climate Change
  - Biodiversity
  - Oceans and Coastal Areas
- **S,T&I for Social Development**
  - Popularization of S, T & I and Improvement of Science Teaching
  - Productive Inclusion and Social Technology
  - Technologies for sustainable cities

- **Sectors – Industrial Policy (Plano Brasil Maior)**

Human Resources Capacity Building

Science without Borders: a major two-way mobility program for students and researchers

Characteristics:

- **Excellency -** the best students and researchers will study and undertake research in the best and most relevant Universities around the World
- **Industrial interest -** the program is already focused in areas of strong industrial interest.
- **Open or clustered approach –** either approach of partnership is possible.
- **Institutional links -** The clustering approach will also lead to the establishment of solid academic links between key institutions.
- **Implementation following rigid standard CNPq practice**
- **Co-funding -** CNPq and the partner Organization will discuss modalities for sharing costs.

www.sciencewithoutborders.cnpq.br

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Science without Borders *(Ciência sem Fronteiras)*

- The mobility program CsF aims at exposing students to an environment of high competitiveness and entrepreneurship, in selected areas relevant to innovation. The CsF Program also aims at attracting young investigators and internationally recognized research leaders to Brazil.
- A total of 101,000 grants shall be awarded from 2011 to 2015, 26,000 of which are to be provided by the private sector.
- Brazil has signed several bilateral research agreements with many agencies and organisations in European countries. Most cover exchange of personnel and joint scientific research projects. Such agreements are being amended in order to include participation in the CsF Program.

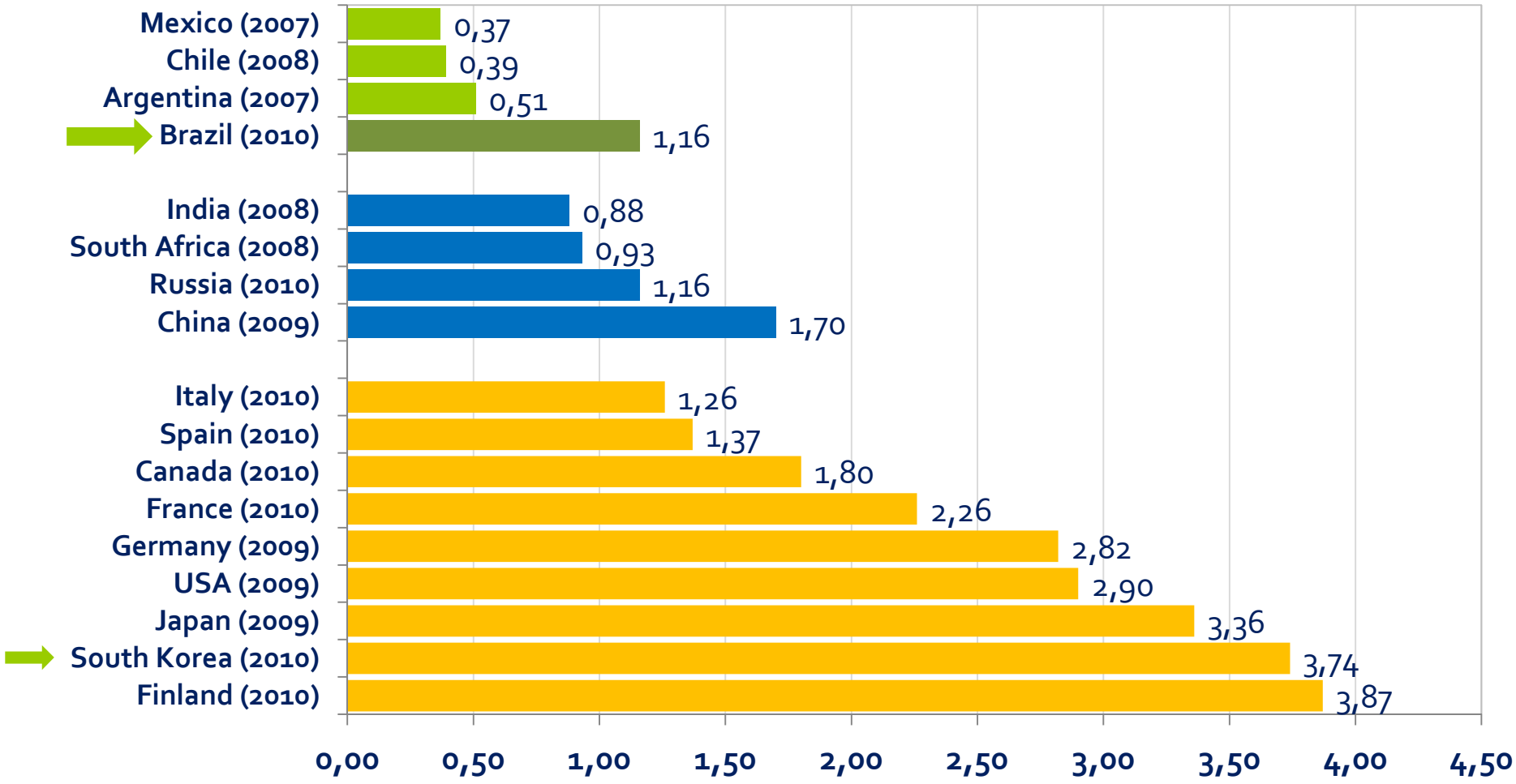
Science without Borders *(Ciência sem Fronteiras)*

Priority Areas

- Engineering and other technological fields
- Exact and Earth Sciences: Physics, Chemistry, Geosciences
- Biology, Biomedical and Health Sciences
- Computing and Information Technology
- Airspace Technology
- Pharmaceuticals
- Sustainable agriculture
- Oil, Gas and Coal
- Renewable Energies
- Mineral Technology
- Nuclear Technology
- Biotechnology
- Nanotechnology e New Materials;
- Natural Disasters Prevention and Mitigation Technologies
- Technologies for Transition towards a Green Economy
- Biodiversity and Bioprospection
- Ocean Sciences
- Creative Industry
- New Technologies for Building Engineering
- Technicians Capacity Building

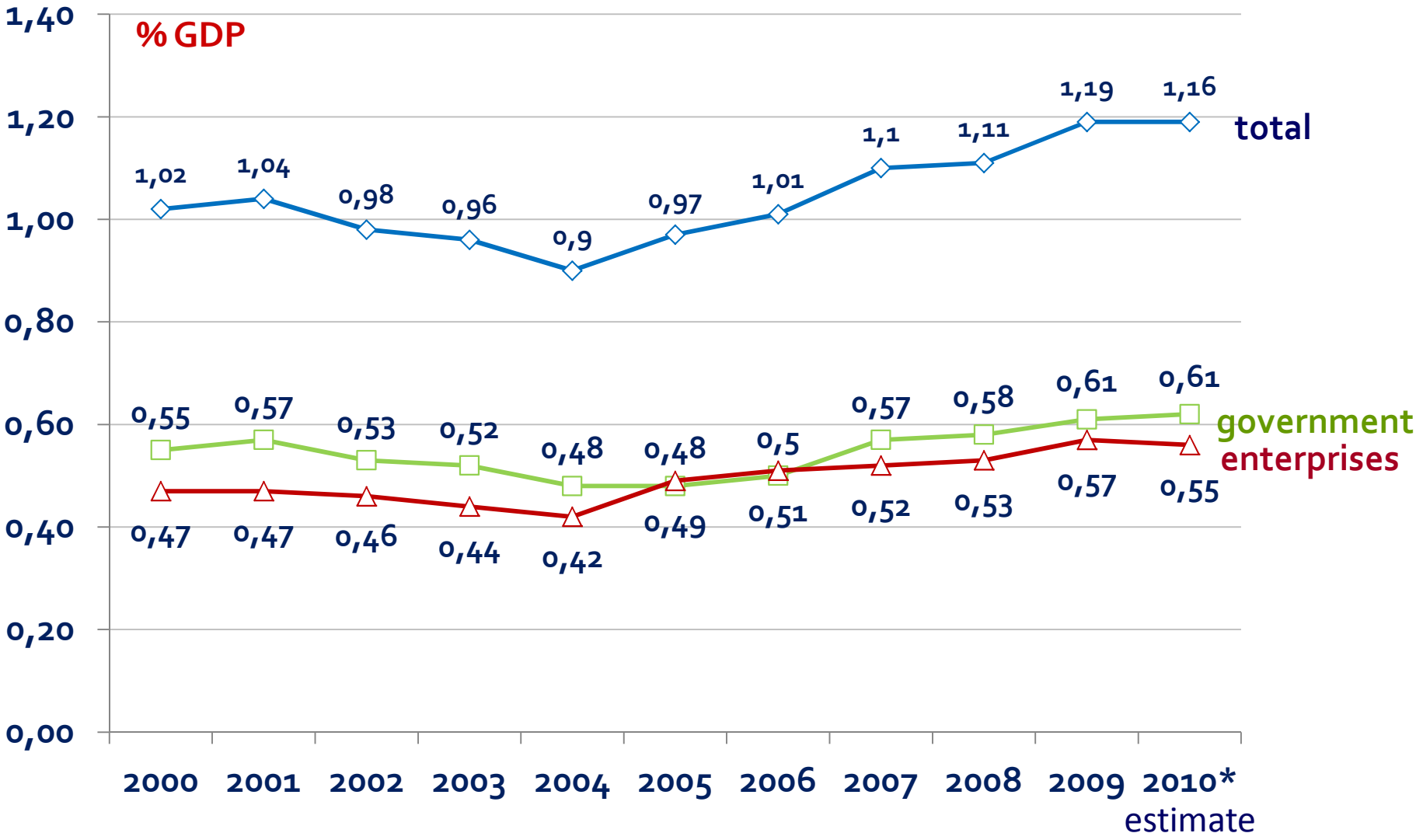
Strengthening the scientific and technological research and infrastructure

Gross Domestic Expenditure on R&D (GERD) as a percentage of Gross Domestic Product (GDP)



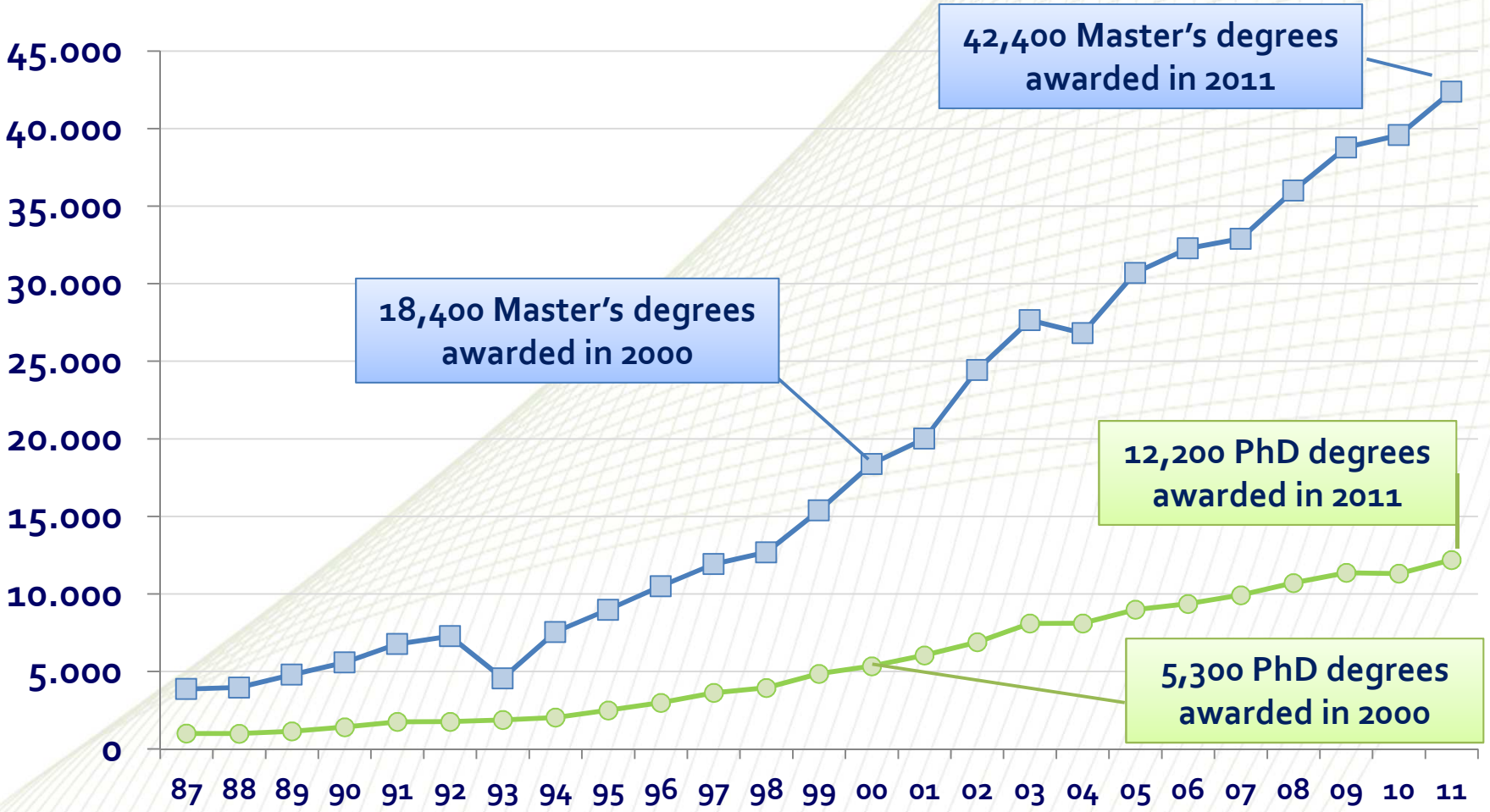
Sources: Main Science and Technology Indicators, 2011/2 – OCDE; India: Research and Development Statistics 2007-2008; Brasil: CGIN/ASCAV/SEXEC/MCTI

National R&D expenditure as GDP ratio (%)



Source: MCTI website

Master's and Doctor's degrees awarded per year



Source: Capes/MEC

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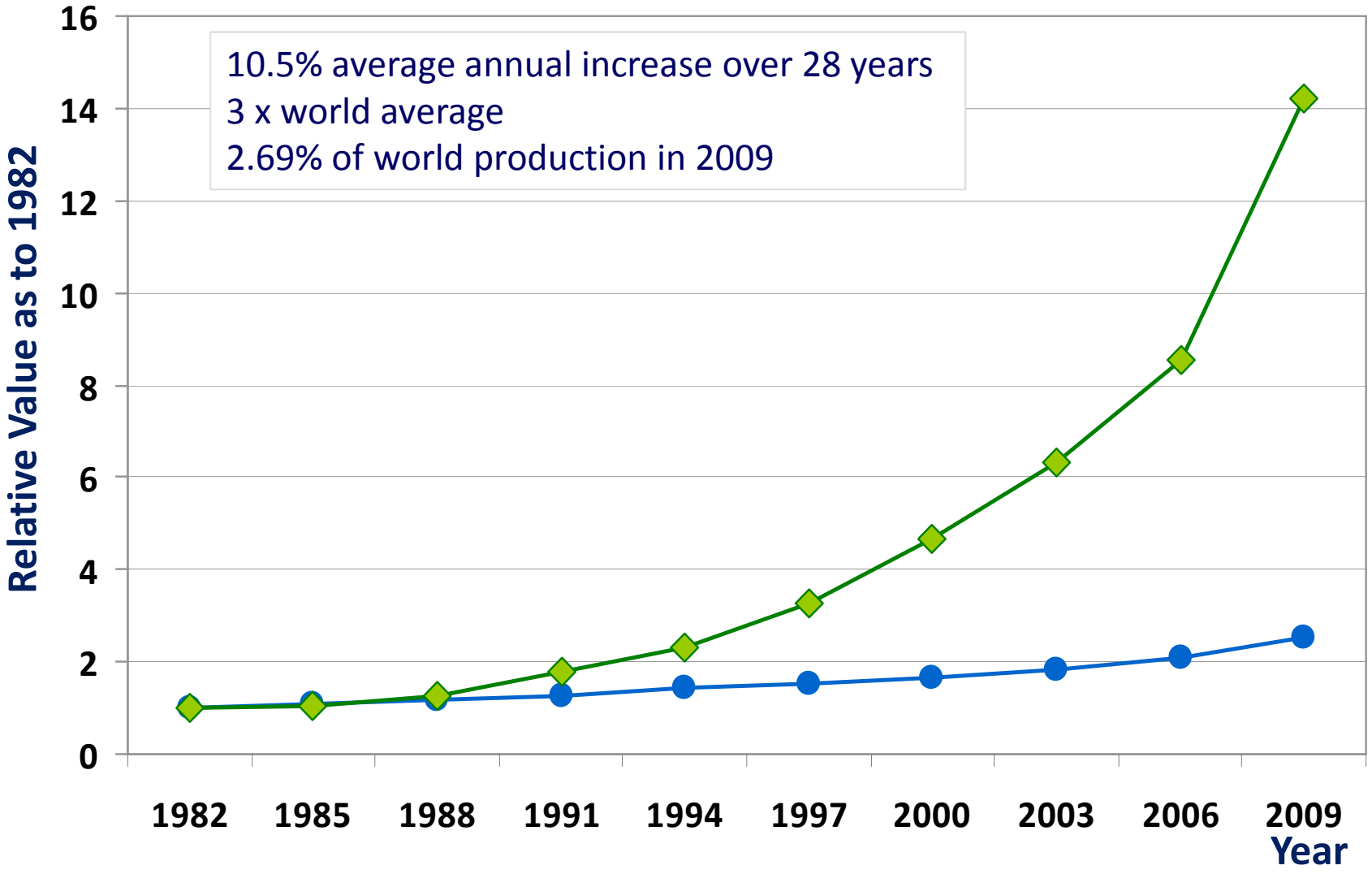
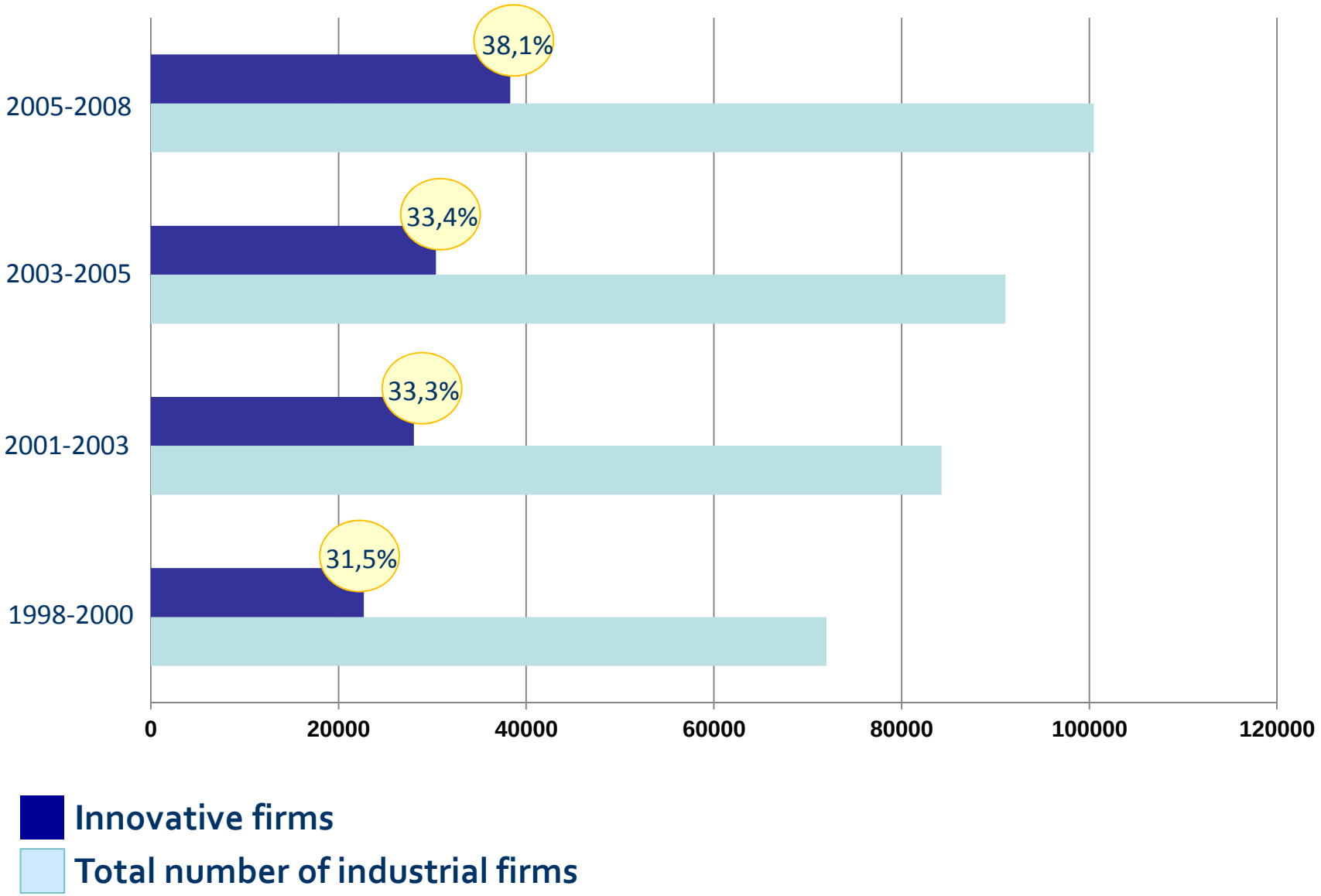
Fast Growth of Scientific Publications



source: Capes/MEC (Thomson)

Innovation rate in industrial firms



Stronger dialogue between STI and industrial policies

PACTI

2007 – 2010 Action Plan
Science, Technology and Innovation for National Development

ENCTI

2012 – 2015 National Strategy for Science, Technology and Innovation

Innovation

PITCE

Industrial, Technological and Foreign Trade Policy 2003-2007

POLÍTICA DE DESENVOLVIMENTO PRODUTIVO

Industrial Development Policy 2008-2010

BRASIL MAIOR

"Brasil Maior" Plan 2011-2014

Strategic Actions

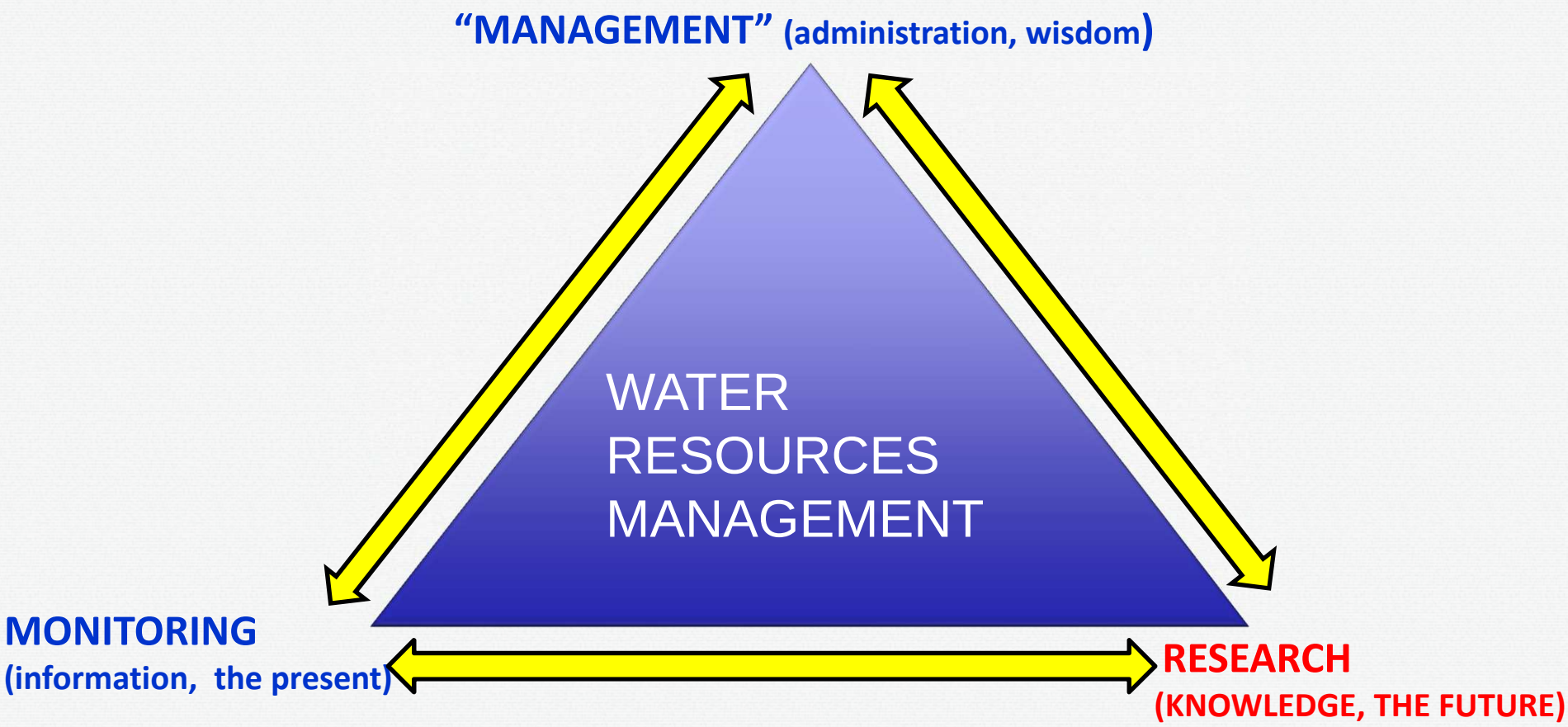
- Agricultural Chain
- Health
- Energy
- Oil and Gas
- Aerospace and Defence
- ICT
- Social and Environmental Sustainability

Horizontal Actions

- R&D, Incremental Innovation, Product and Process Engineering
- Support for Small Enterprises
- Technological Infrastructure for Innovation

C,T&I for water resources

Water resources management – basic concept



C,T&I for water resources

Research: s&t development

Impact of water uses on the environment;

Technological innovation for:

•Rational water use and water reuse;
•Wastewater treatment (nanotechnologies etc);
•Water desalinition (ocean and brackish water – nanotechnology application)
•Monitoring (new technologies and equipments);
•Development of more efficient irrigation equipments and methods with less water consumption.

Legal and institutional framework;

- Hydrology, hidrogeology, hydrometeorology, climatology, water resources and climate changes, urbanization (**water in the cities**);
- Urban water security;
- New water resources management approaches: integrated urban water management.
- Capacity building.

S,T&I for water resources

Objectives within the PACTI programme

To promote S,T&I activities and human resources capacity building focused on:

- education for S&T and for the advance of knowledge;
- impact on the environment and on the citizen scientific and technological
- development aiming at sustainable development;
- production of goods and services in a society characterized by regional and social inequalities ;
- large impact programmes;
- national mobilizing projects and issues that inhibit S,T&I insertion on the social and economical development of the country.

S,T&I for water resources

National Water Research Institute (Instituto Nacional das Águas – INA)

- Created under Law 12.954 of Feb 5th 2014

- It will be implemented on the five Brazilian Regions and its headquarters will be in the Federal Capital

Purpose

To promote integrated water resources management and scientifical and technological development, fostering, implementing and executing studies, research and the development of sustainable sollutions .

National Water Institute (INA)

Main objectives:

- **To promote studies and research on integrated water management;**
- **To promote studies and research for regional demands;**
- **To develop technologies to recuperate water bodies;**
- **To assess in the definition of public policies;**
- **To develop educational contents on water management and conservation; etc.**

S,T&I for water resources

CT-Hydro (Water Sector Fund)

- Created in 2001 with the objective to foster the scientific, technological in the domain of water resources in Brazil.

- This Sector Fund has already invested circa USD 170 million in research projects all over the country

Some challenges in S,T&I in *water resources*

- **Adaptive water resources management;**
- **Urban water security;**
- **Water and wastewater treatment (sanitation)**
  - ***Contamination by emerging organic and inorganic micropollutants;***
  - ***Contamination by emerging pathogenic microorganisms;***

Some challenges in S,T&I in *water*

- **Water quality:**
  - **Standards;**
  - **Monitoring;**
  - **Water bodies classification;**

- **Hydrometeorologic networks.**

Some challenges in S,T&I in *water*

Actions

- **Research and innovation on diagnosis (detection), monitoring, and treatment (removal) of micropollutants;**
- **Development of analytical techniques, providing practical results, in order to achieve low costs and high precision;**
- **Establishment of research networks among Brazilian and Dutch scientists.**

Some challenges in S,T&I in *water resources*

Some possible research topics:

- **Detection and removal of emerging micropollutants and pathogenic microorganisms;**
- **Prevalence of organic and inorganic micropollutants, and emerging pathogenic microorganisms;**
- **Dynamics of micropollutants and pathogenic microorganisms in the environment;**
- **Environment quality standards and water quality standards (surface and groundwater);**
- **Engineering works to prevent and control flood in urban and protection of coastal areas.**

Some final considerations

- Water Management reform in Brazil is based on decentralization, economic instruments, public participation, S,C&T investments and river basin management.

- MCTI is playing an important role funding and investing in S,T&I programs and projects to foster development in the water sector in Brazil.

Some final considerations

- Significant practical results have been achieved in the last 15 years of operation of MCTI/PROSAB (Sanitation Program) and the Water Sector Fund (CT-Hydro).

Some final considerations

- Brazil is experiencing a cycle of robust investment in S,T&I various fields

- time is right to incorporate more innovation into this wave of investments

Innovation is a permanent agenda for government and for the business sector

Innovation policies are top priority

Obrigado!

Dank U Wel!

Thank you!

□□□□□□□□□□ A· M· Leitão

sanderson.leitao@mct.gov.br

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