GOVERNO FEDERAL

BRASIL

PAÍS RICO É PAÍS SEM POBREZA

Ministry of Science, Technology & Innovation

ASSESSING THE ECONOMIC IMPACT OF NANOTECHNOLOGY

Adalberto Fazzio

Nanotechnologies Coordinator

AAAS ADVANCING SCIENCE, SERVING SOCIETY

National Nanotechnology Initiative

OECD

OVERVIEW ON BRAZILIAN NANOTECHNOLOGY INICIATIVES

Brazil- Historical challenge

3rd largest oil company in the world

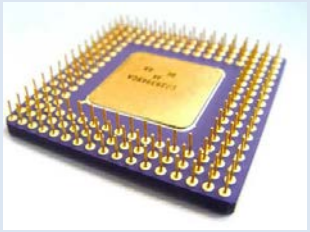
6th largest* automotive manufacturer

2nd largest mining company

50% of fuel consumption comes from sugar cane ethanol

Brazil is the **3rd largest food exporter**

3rd largest civil aircraft manufacturer



Big-Chalenge
2008-manufacture
17% of GDP
2011- manufacture
14% of GDP

1950	1960	1970	1980	...	Today
Energy shortage	No Automotive Industry	Basic Inputs Development	Oil Crisis	Agriculture Expansion	Aircraft Industry development	Innovation Challenge

*Non-exhaustive list

Nanosciences & Nanotechnology
Numbers & Facts in Brazil

Cooperative Networks: **24**

National S&T Institutes on Nanotechnology: **16**

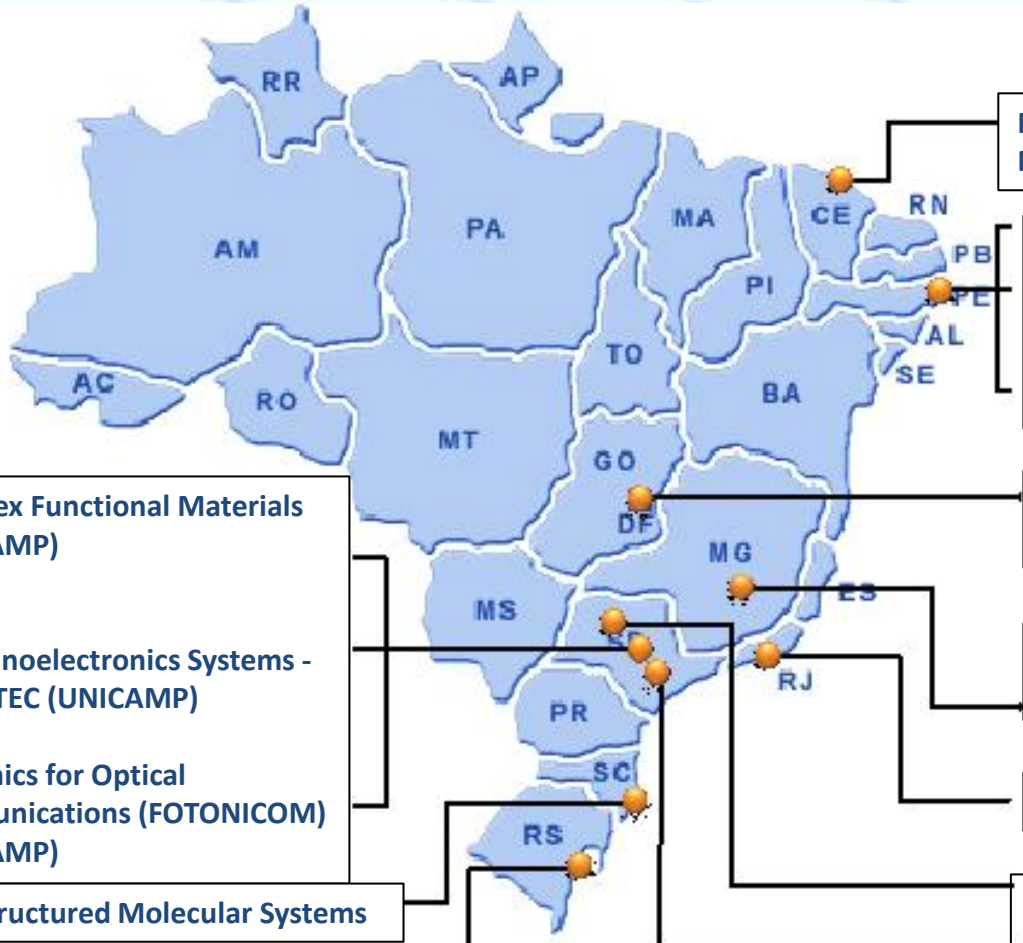
National Labs :**8**

Researchers > **2500**

Graduate(Msc +PhD) > **3000**

Around **2,1%** of the world Nanosciences papers

National Institutes of S&T - Nanotechnology



Nanobiostructures and NanoBioMolecular Simulation (UFC)

Pharmaceutical Innovation (UFPE)

Photonics (UFPE)

Nanotechnology for Integrated Markers for (UFPE)

Complex Functional Materials (UNICAMP)

Micro and Nanoelectronics Systems - NAMITEC (UNICAMP)

Photonics for Optical Communications (FOTONICOM) (UNICAMP)

Nanobiotechnology of Midwest and North(UNB)

- Carbon Nanomaterials (UFMG)
- Nano-Biopharmaceutics (UFMG)

Semiconductor Nanodevices (PUC / RJ)

Nanostructured Molecular Systems

- Nanotechnology in Materials Science (UNESP)
- Organic Electronics (USP)
- Optics and Photonics (USP)

Surface engineering (UFRGS)

The Carbon National Institute

CTNANOTUBOS

National Research Network on Carbon Nanotubes (2006-2010)

National Science and Technology Institute of Carbon Nanostructured Materilas 2009 - 2013

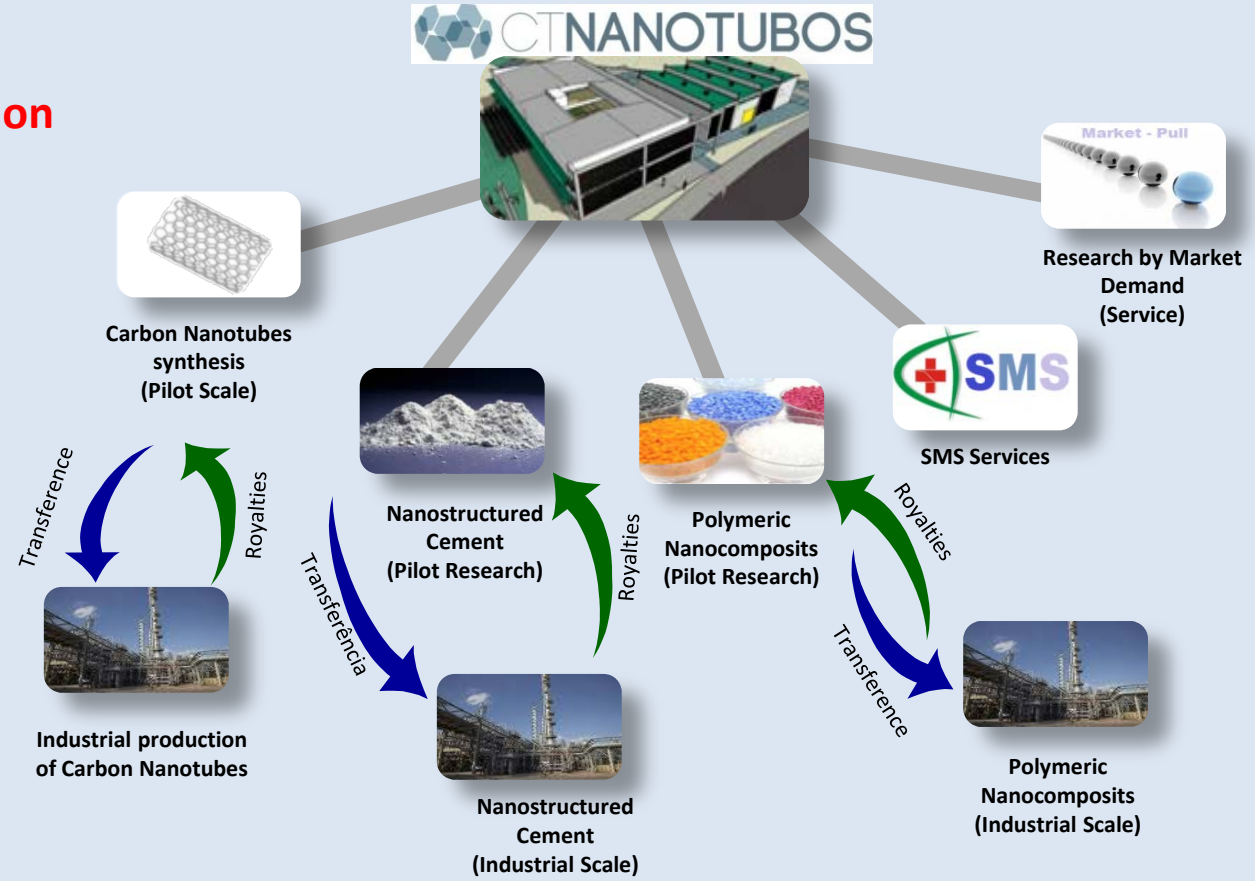
54 researchers including physicists, chemists, biologists and engineers

19 research institutions and companies in 8 Brazilian States

Technology Center on Carbon Nanotubes

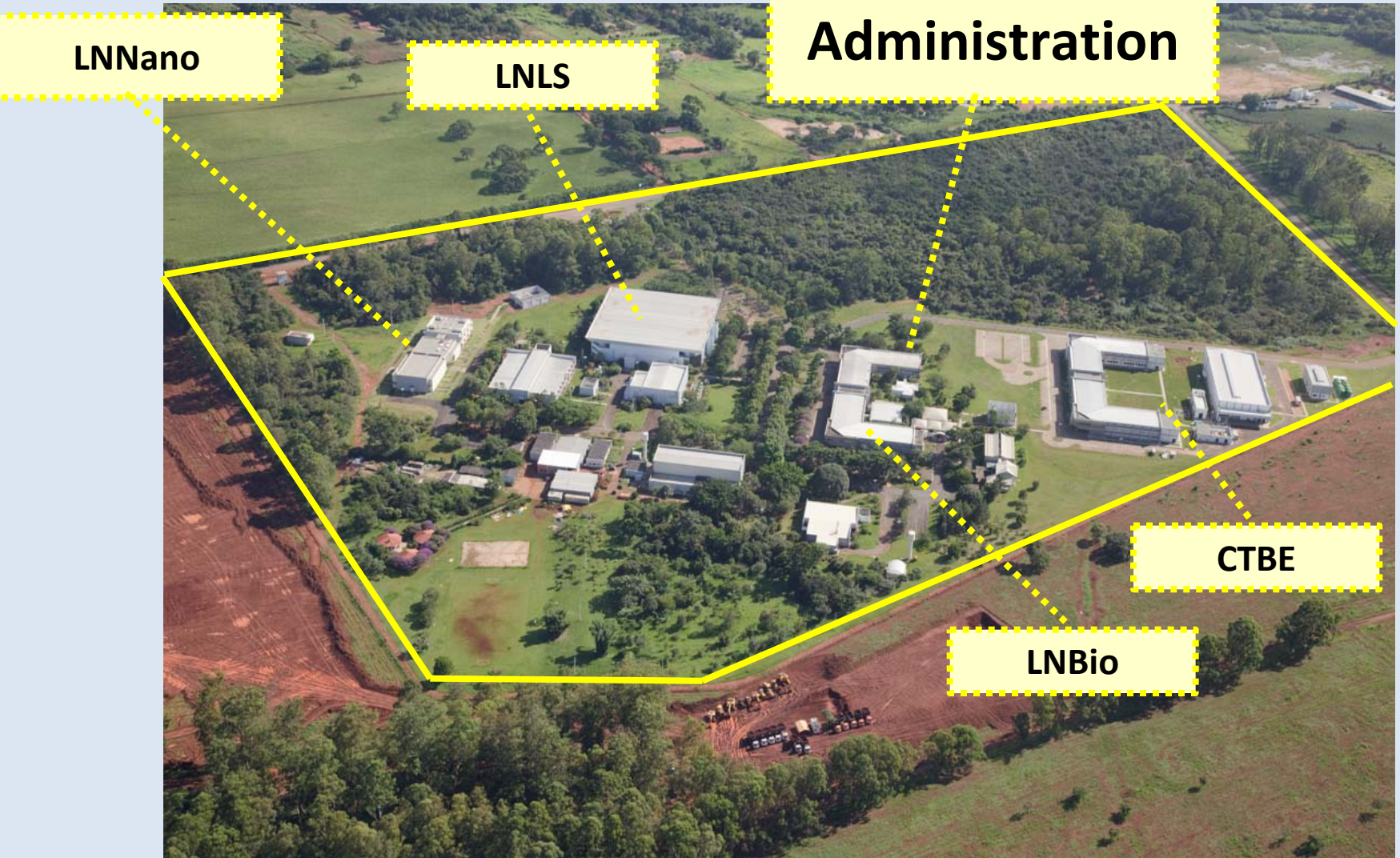
A platform for the transfer of new technologies

US$ 20 Million

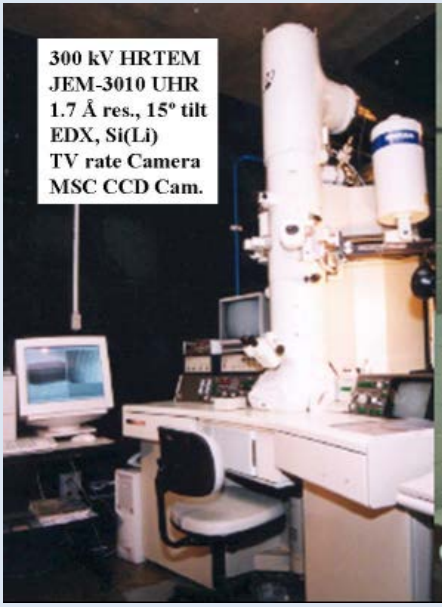


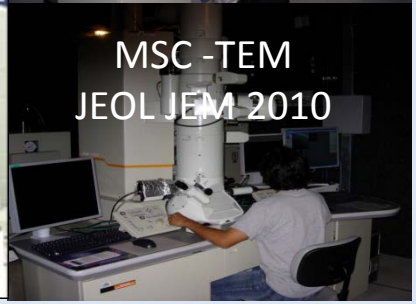
Nat.Center of Research in Energy and Materials- Campinas-SP

CNPEM



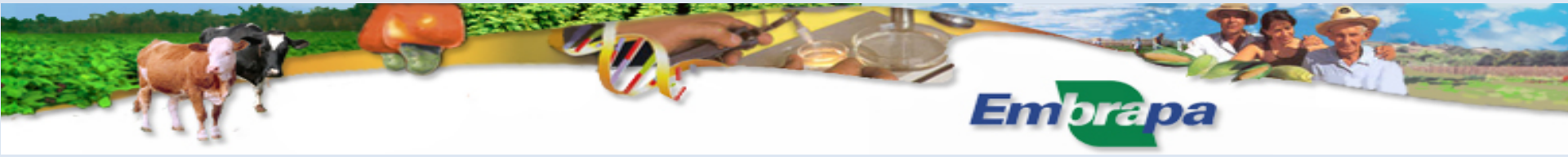
LNNano





Electron, STM, AFM Microscopies
Microfabrication Lab.

National Nanotechnology Laboratory for Agriculture (LNNA)



Nanotechnology Network Applied to Agribusiness

Embrapa Instrumentação Agropecuária
São Carlos, SP

Nanotechnology

Nanotech Research network:

- 150 researchers

- 54 research centers and universities

Cellulose Nanofibers: from different sources

1-white and colored cotton

2-curauá

3-sisal

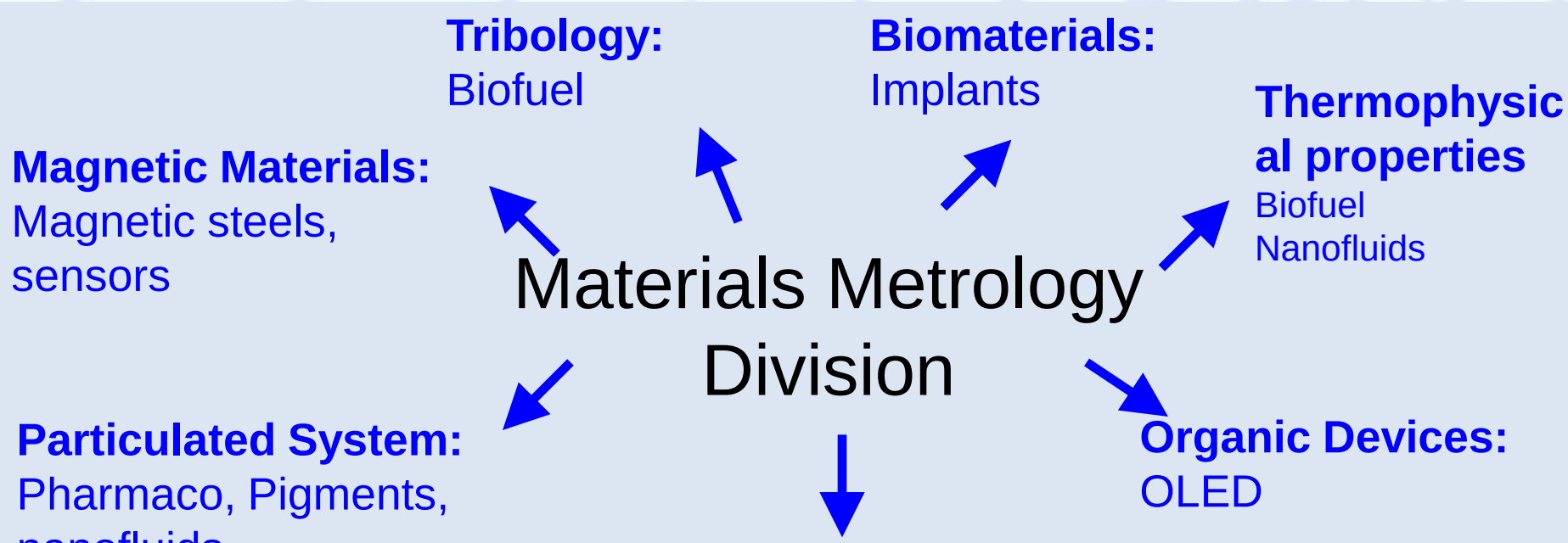
4- sugarcane bagasse

5- coconut fiber waste

Inmetro Campus at Xerém - RJ

www.inmetro.gov.br

Materials Metrology



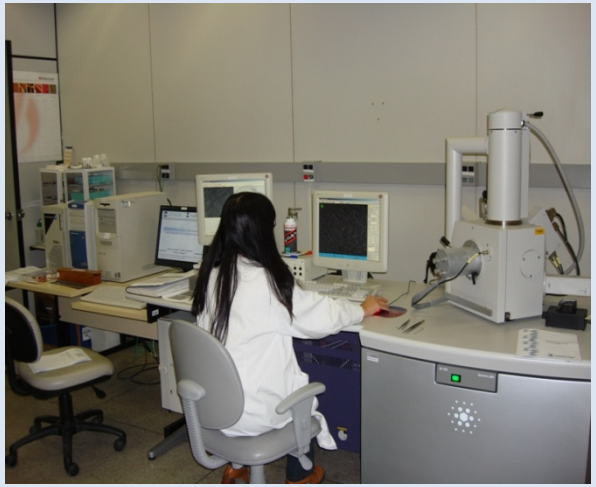
Nanometrology:

Microscopy and Nanomaching
Surfaces and Thin Films:Nanocatalysis
Carbon Nanotubes (CNT) characterization
Nanobiometrology: proteomic, biomembrane

7 group leaders
24 post-docs

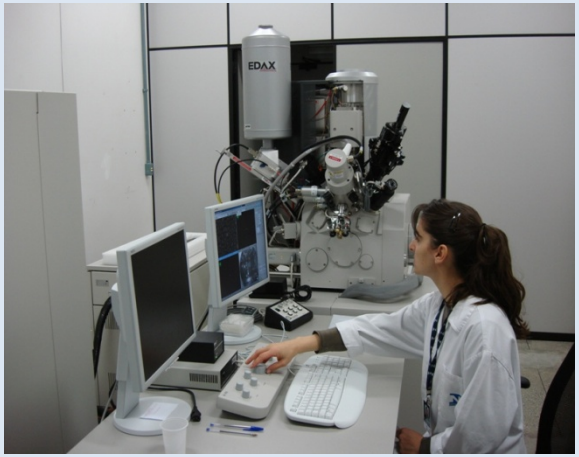
Microscopy

SEM + EDS + EBSD

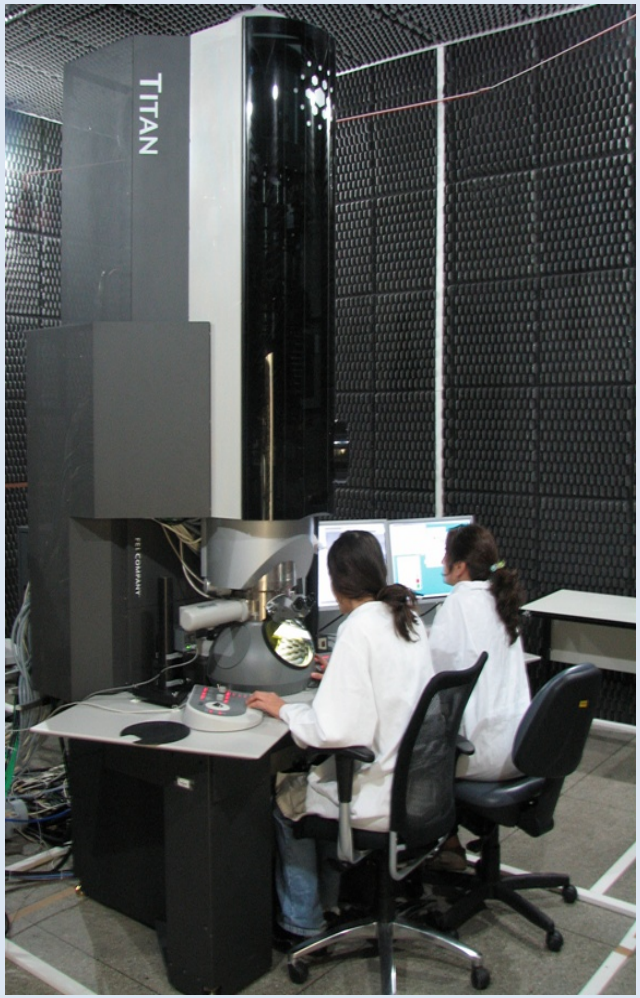


TEM

Dual beam – FIB+MEV

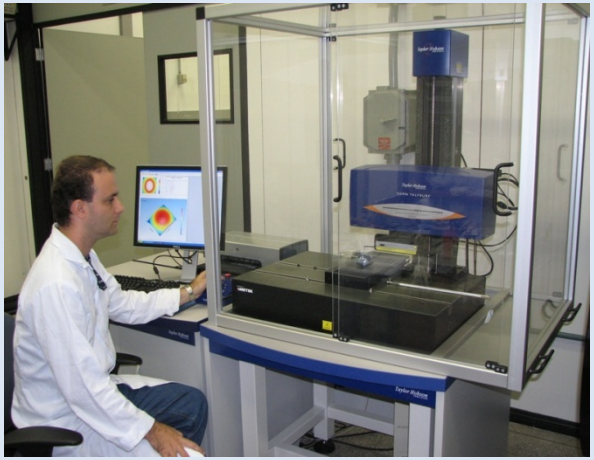


TEM with Cs correction



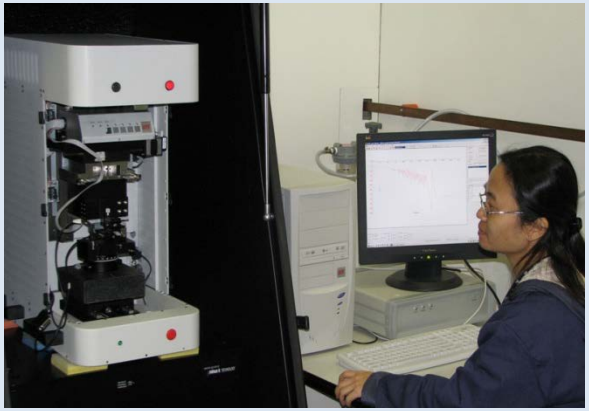
Surface phenomena

Tribometer



Friction simulator

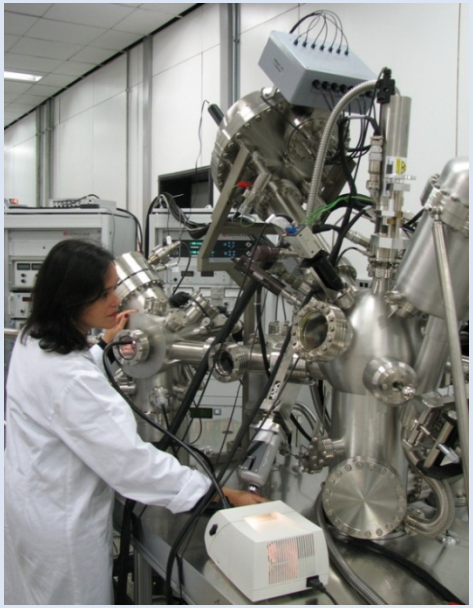
Micro-tribometer



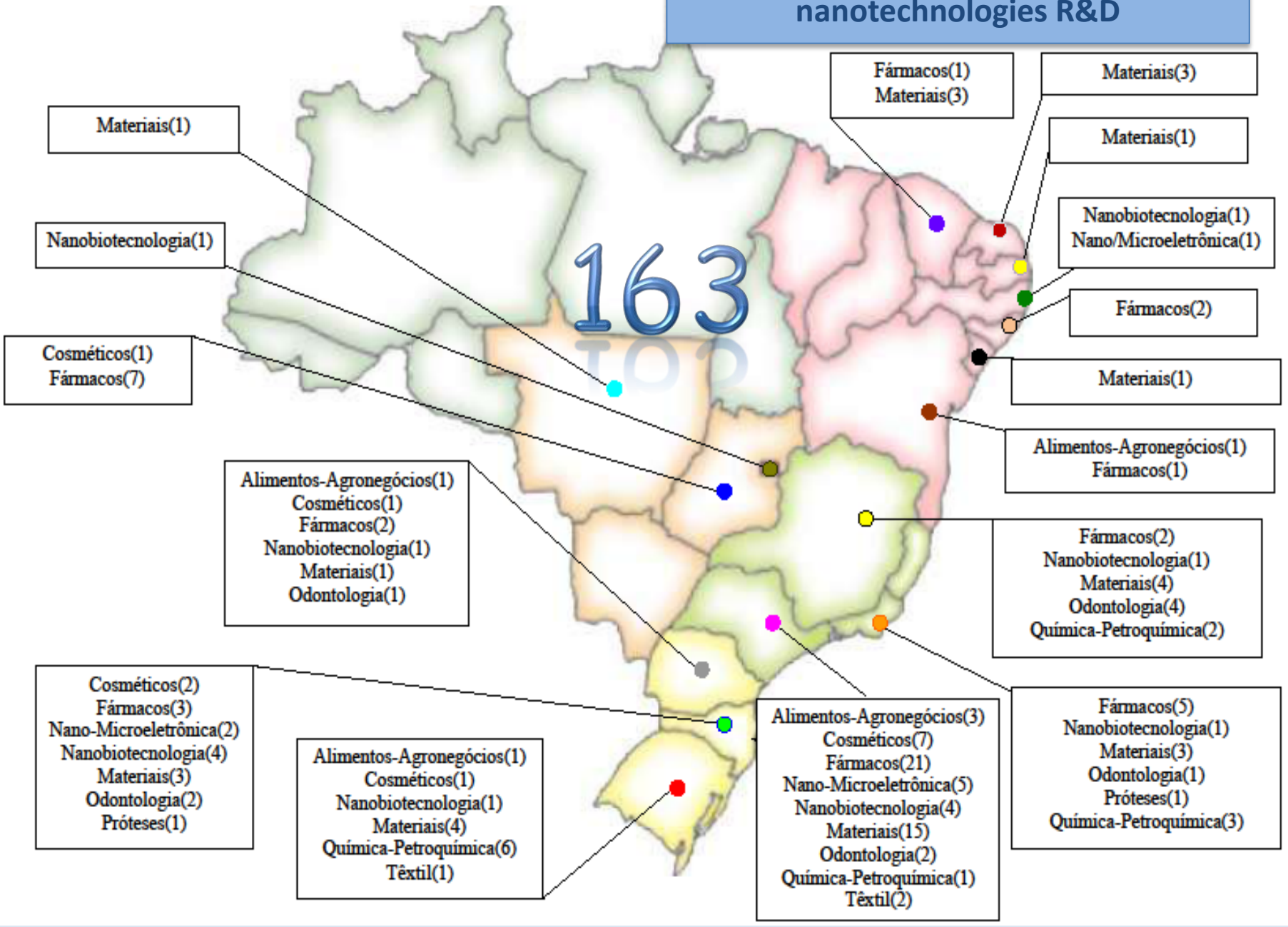
Ultra-high vacuum STM

AFM

XPS + AES + ISS + LEED

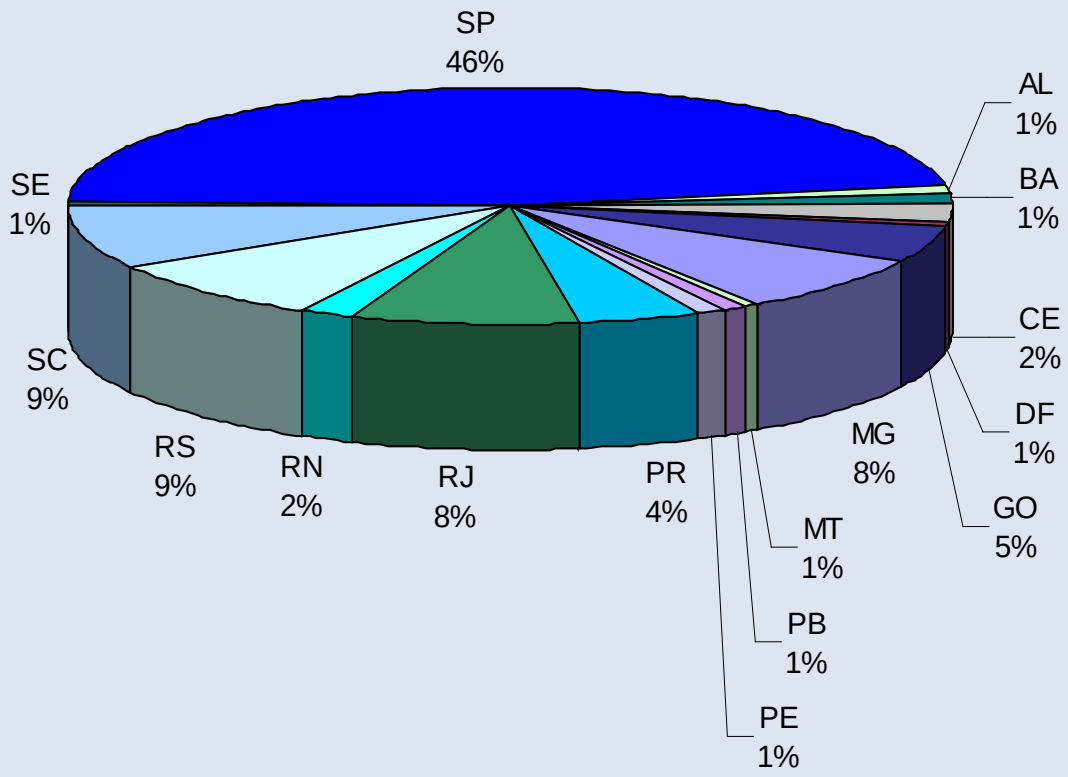


Companies that develop/use nanotechnologies R&D



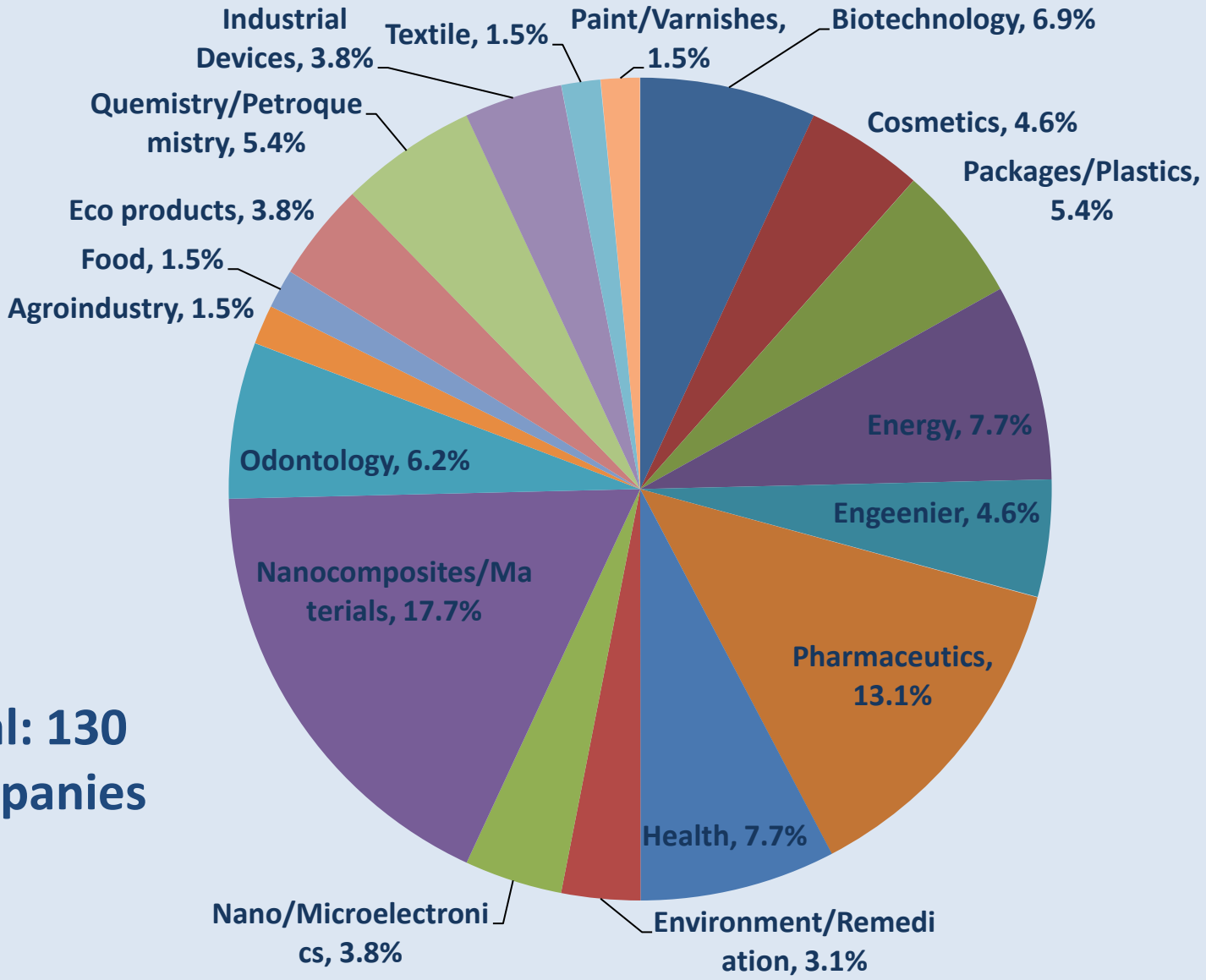
Companies that develop/use nanotechnologies

Distribution among the states



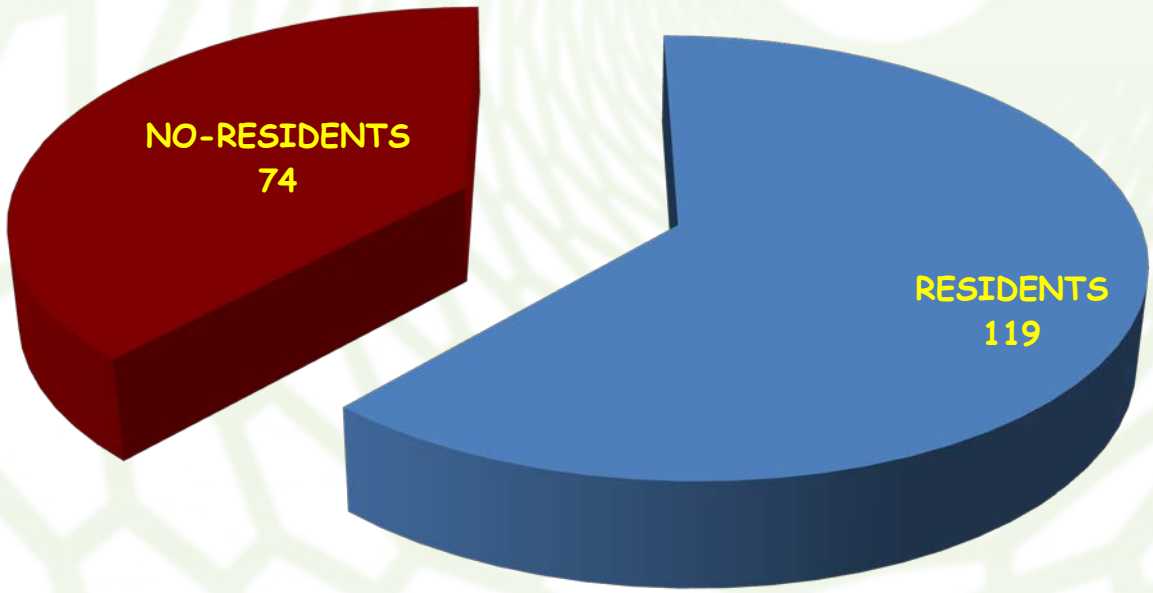
Total: 162 companies

Companies covered by economical subsidy



Total: 130 companies

PATENT DEPOSITED IN BRAZIL (nano)
2004-2009

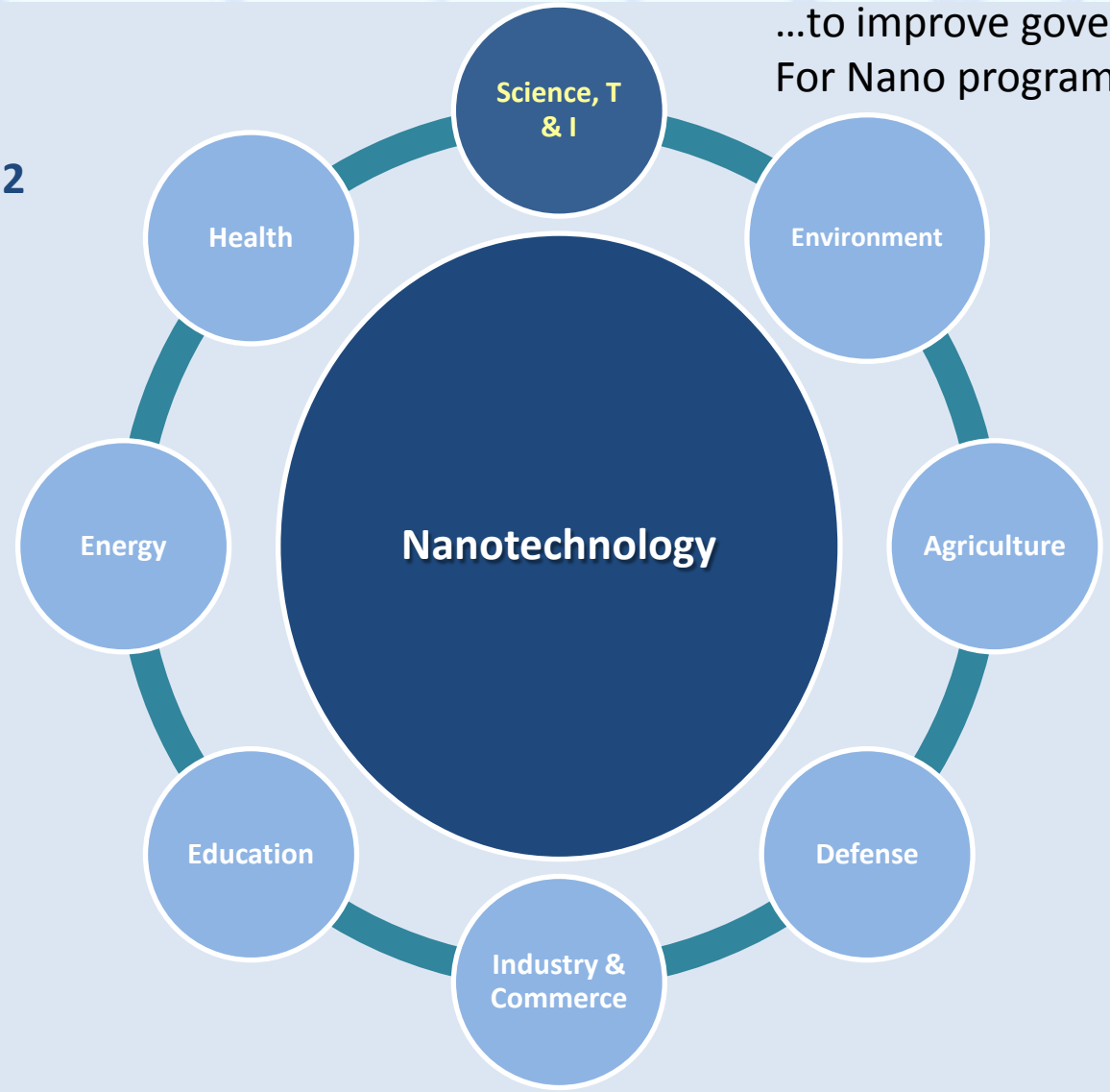


: INPI..

Nanosciences & Nanotechnology governance - Interministries Nanotechnology Committee

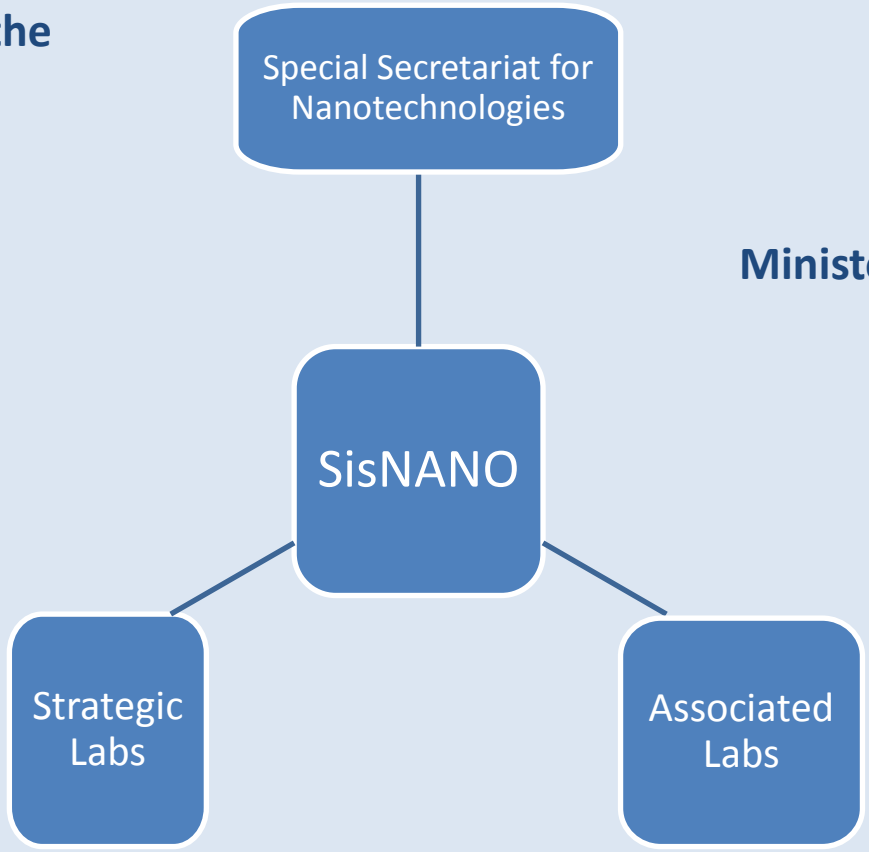
…to improve governance and policies
For Nano programs in Brazil

Ministerial Order - 2012



System of Nanotechnology National Labs

Lauch of a System of Nanotechnology National Labs to coordinate and optimize the infrastructure sharing.



Ministerial Order - 2012

Strategic Areas

Energy

Defense

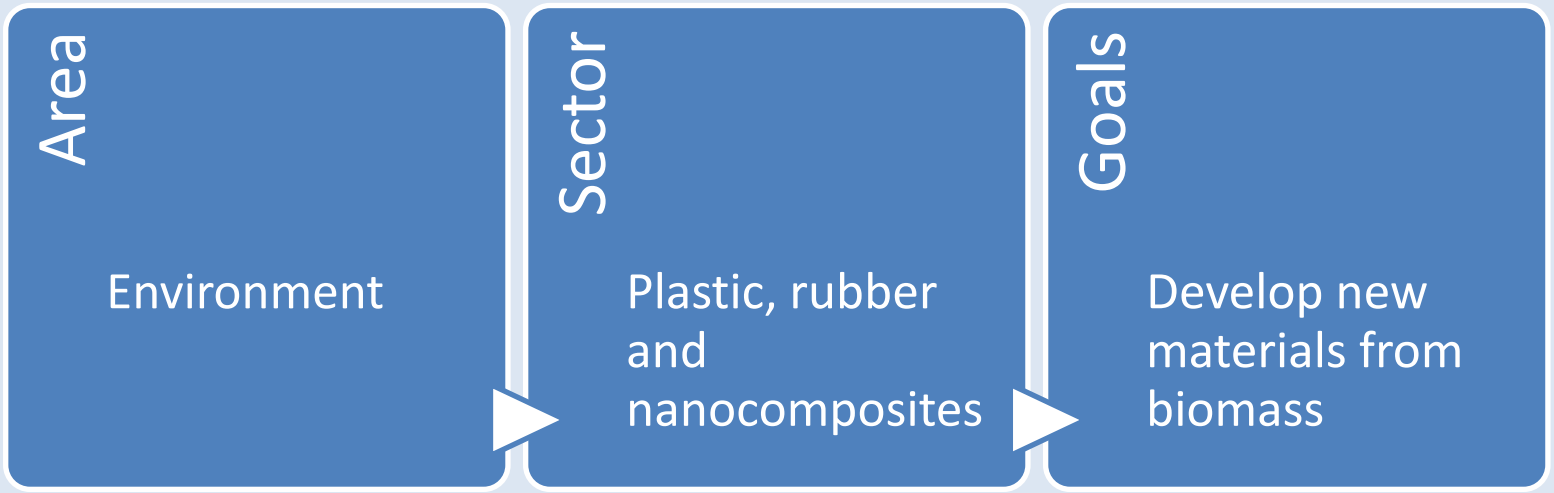
Environment

Health

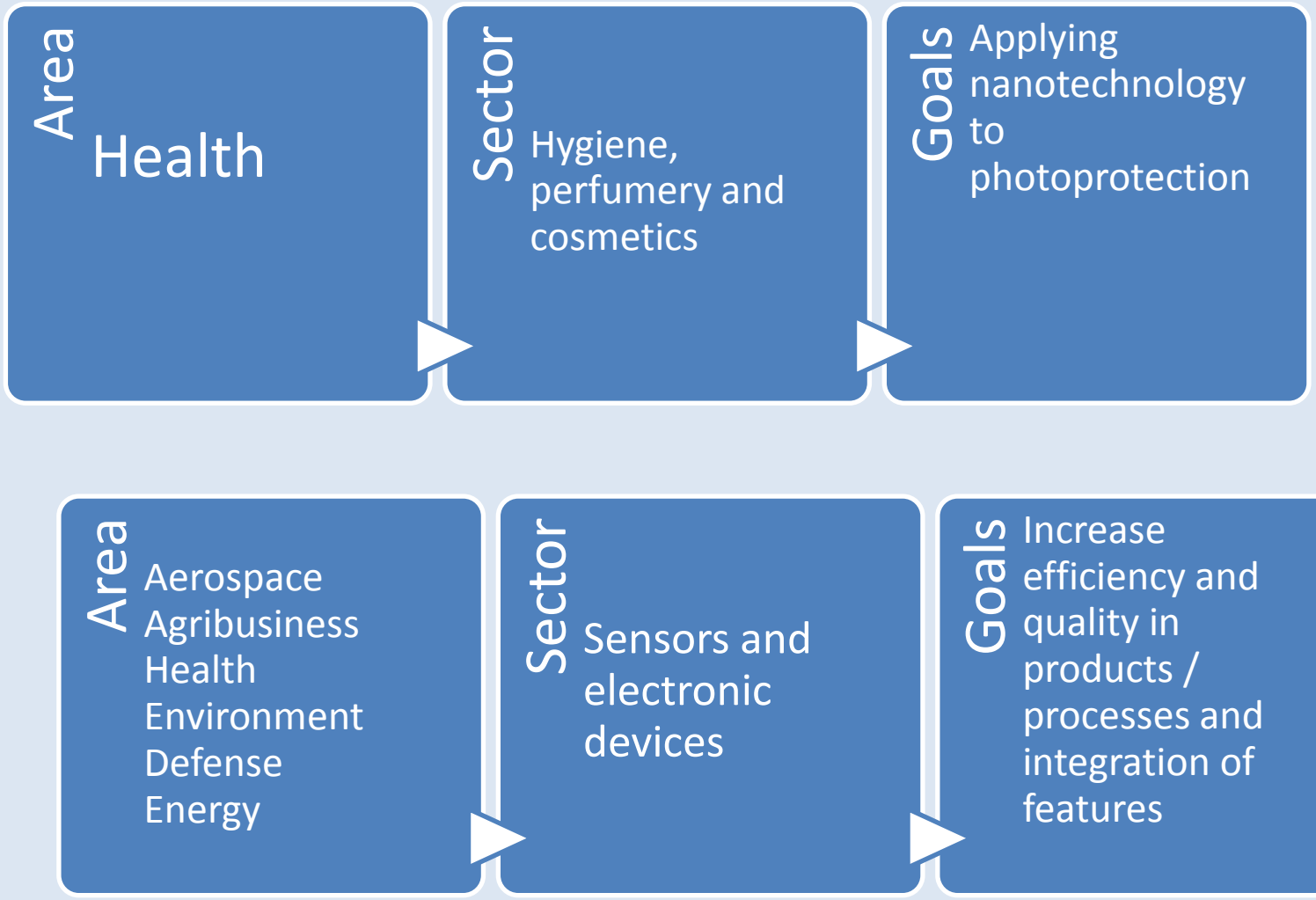
Aerospace

Agribusiness

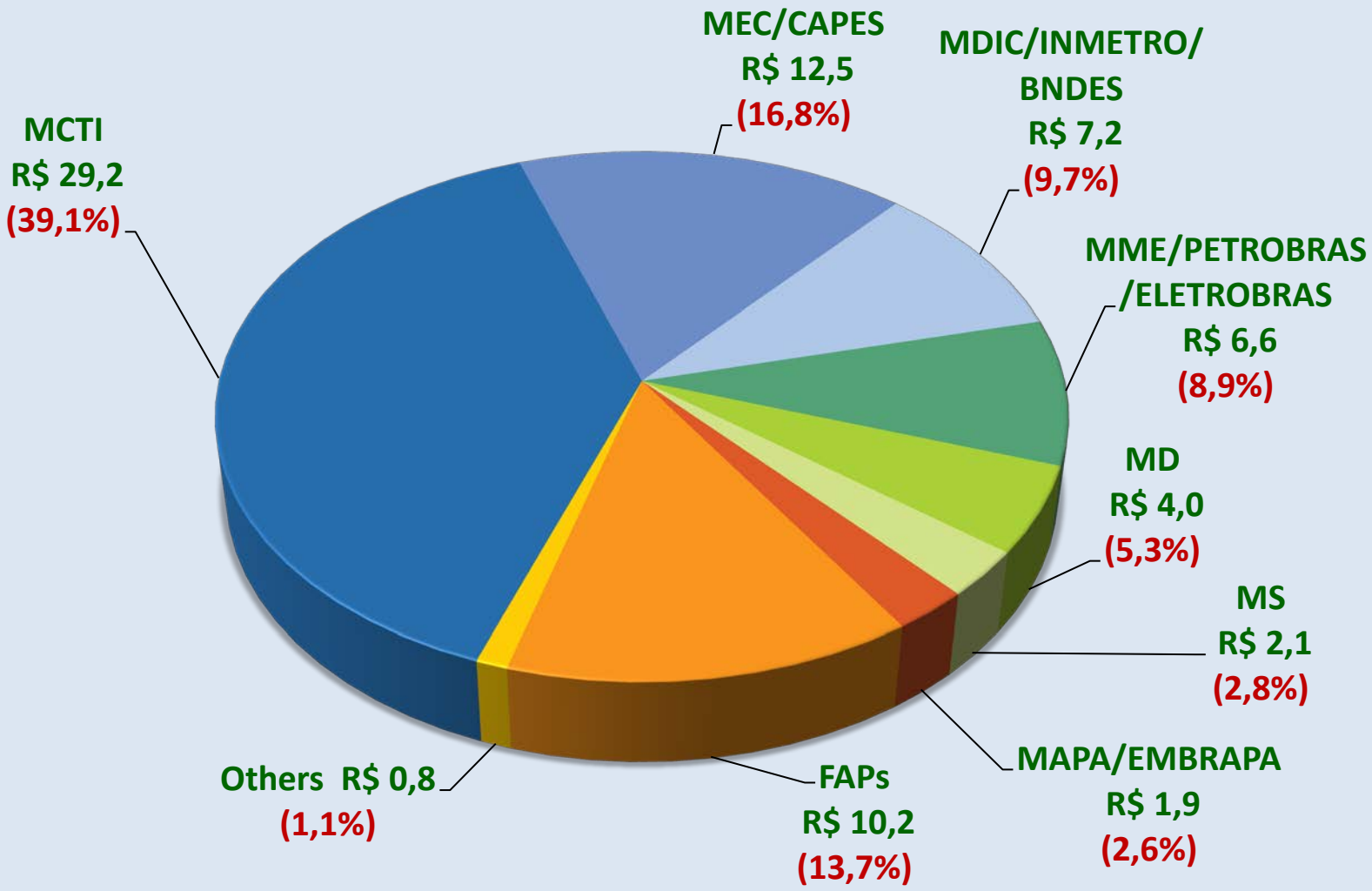
Strategic Areas & Industry Sectors



Strategic Areas & Industry Sectors



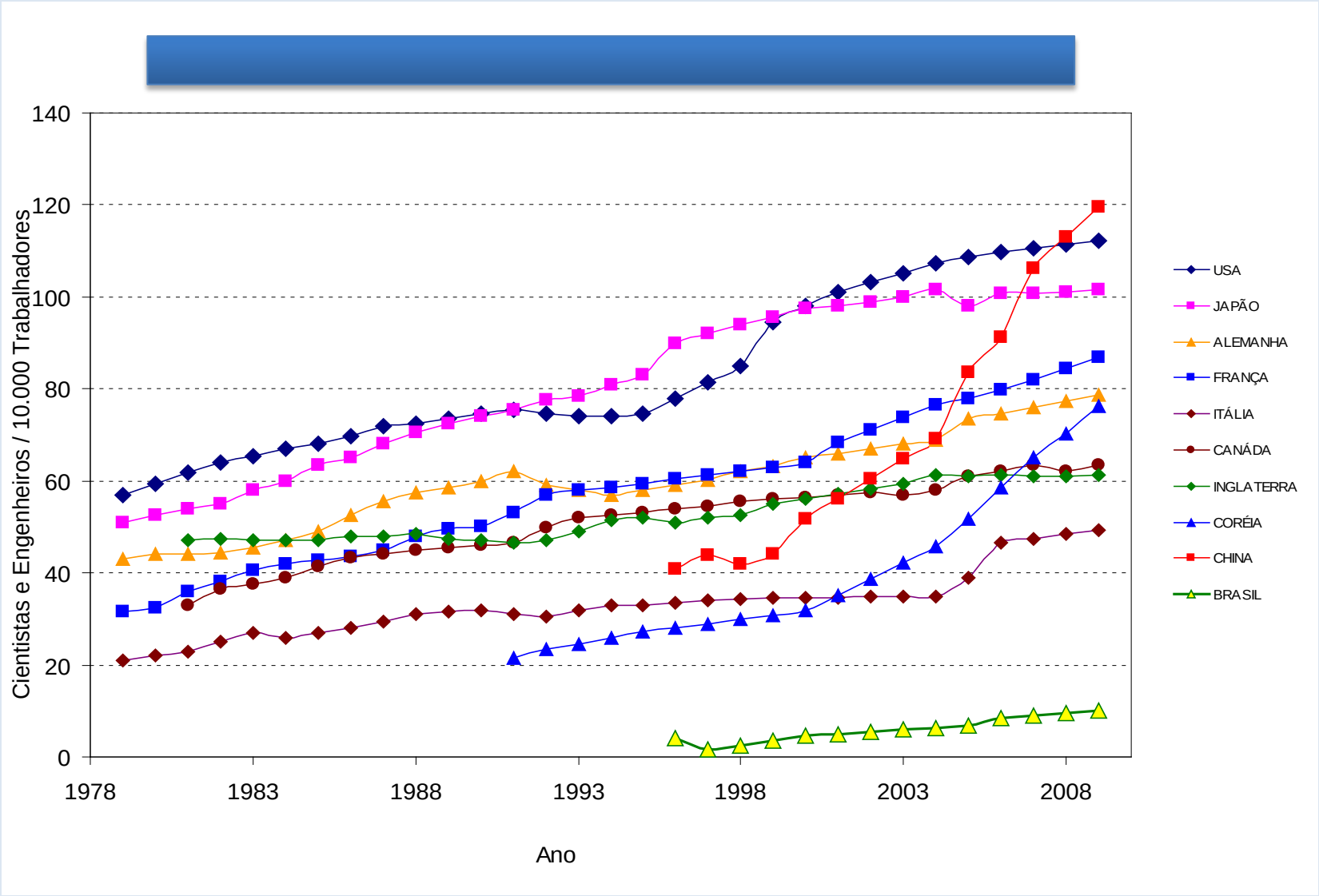
Estimate financial support



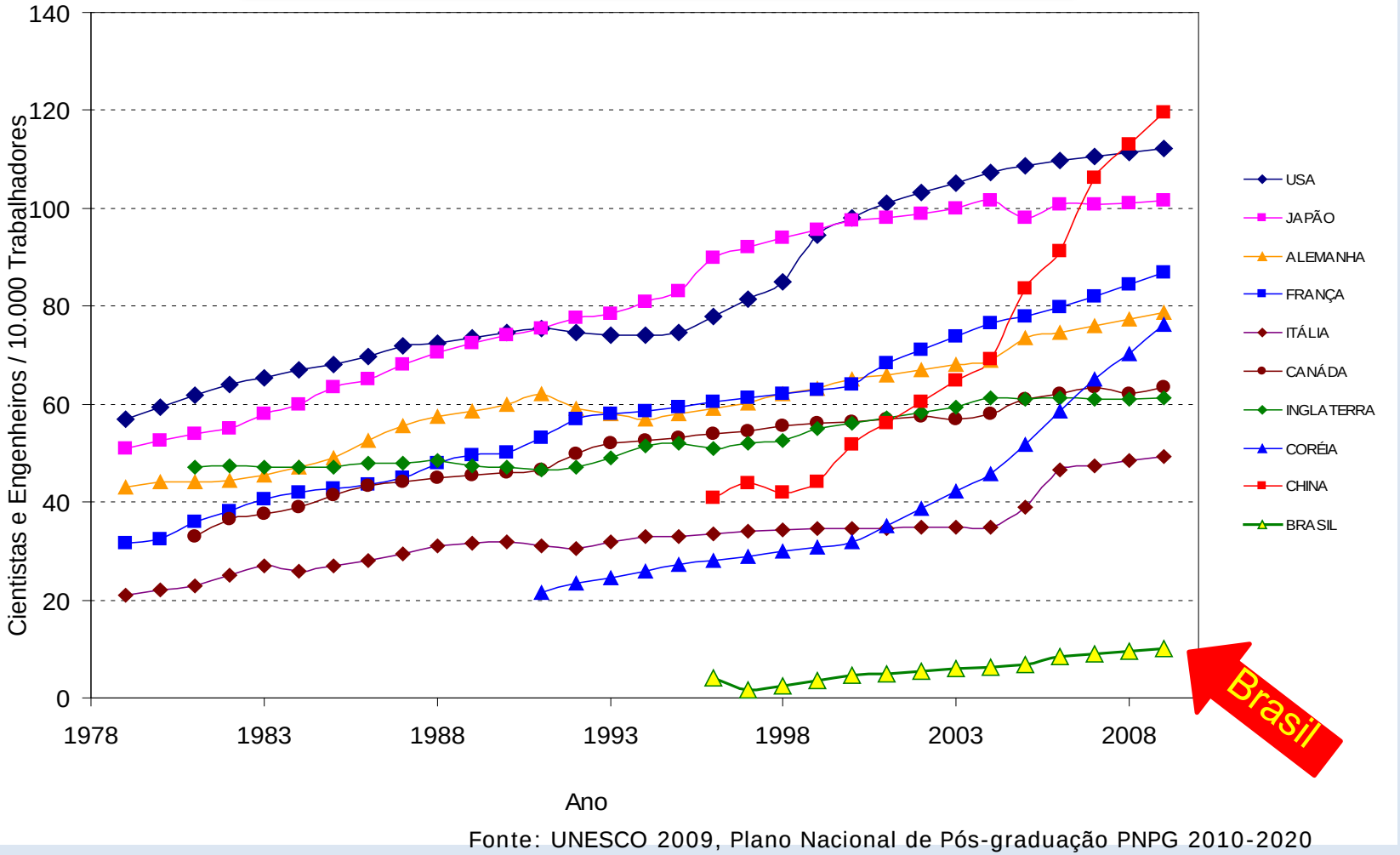
2012 – 2015

R$ 74,6 billions (~US $ 44,5 bi)

Researchers & Scientists on R & D in Industries



Researchers & Scientists on R & D in Industries



Fonte: UNESCO 2009, Plano Nacional de Pós-graduação PNPG 2010-2020

CIÊNCIA
SEM FRONTEIRAS

Science without Borders:

The Brazilian ST&I mobility program

at

CNPq/MCTI - CAPES/MEC

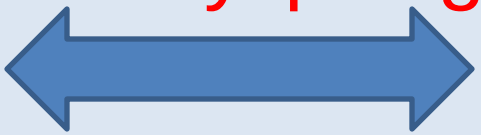
100 000 students in 4 years

GOALS

Enhance Brazilian science, technology, innovation and competitiveness through the expansion of international mobility.

- Increase the presence of Brazilian researchers and students at various levels in institutions of excellence overseas;
- Increase the innovative expertise of personnel from the technological industries;
- Attract young scientific talents and highly qualified researchers to work in Brazil.

Two-way program



PRIORITY AREAS

- Engineering and other technological areas
- Basic and Natural Sciences
- Health and Biomedical Sciences
- Information and Communication Technologies
- Aerospace
- Pharmaceuticals
- Sustainable Agricultural Production
- Oil, Gas and Coal
- Renewable Energy
- Biotechnology
- **Nanotechnology and New Materials**
- Technology for prevention and mitigation of natural disasters
- Biodiversity and bioprospection
- Marine Sciences
- Minerals
- New technologies for constructive engineering
- Formation of technical personnel

Science Without Borders

- **100 000 Grants and Scholarships will be given for PhD students , visitor professors, postdocs and undergraduate Brazilian students to study and work abroad(.75 000 gov. +25 private)**

- **The program is a great opportunity to straighten the colaboration of Nanosciences research groups as well as for companies With R&D on Nanotechnology to interact with Brazilian groups.**

- Several American Universities are already receiving Brazilian researchers and students under the science without borders program.

Thanks for your attention

Contact

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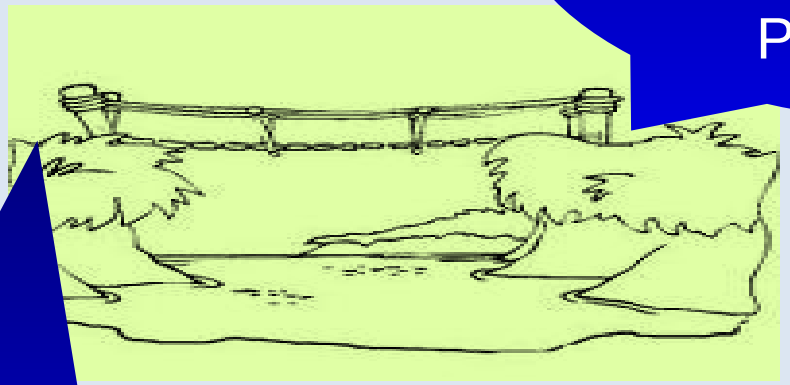
TODAY

Productive Sector,
Small Companies,
Medium Companies,
Big Companies,
Private Sector



Academia,
Institutes of Technology,
Research Centers,
Universities

TOMORROW

Productive Sector, Small Companies, Medium Companies, Big Companies, Private Sector

Academia, Institutes of Technology, Research Centers, Universities