



The Brazilian S&T Landscape

International scientific and technological cooperation demands good knowledge of the overall system and potential of research in the partner country, a strong factor for the accurate targeting of actions. To this end, having an insight into the architecture of the Brazilian Research System can be highly valuable¹.

It is convenient to adopt a functional interpretation framework in order to present the architecture of a system of research. As well as the actual performance of research, a distinction is made between a programming-financing function and one of steering and orientation. The analysis finishes with examination of the assessment function which allows effective completion of the research process. Each of the functions is assigned to a different institution.

The core of the Brazilian research system is run by the operators, i.e. the institutions that conduct the research: these will be presented first. Steering of public sector research, however, falls to ministerial departments. The description of the system ends with intermediary structures responsible for programming and assessment.

However, Brazil's federal organization means that there are two levels of political and operational decision-making: federal and federate. These two levels appear to have the intention of acting according to a principle of rationality tending towards an increasingly strong partnership between the country's different active science and technology research actors, whether they are supervisory, financing, steering or assessment bodies.

I. Organization flow chart

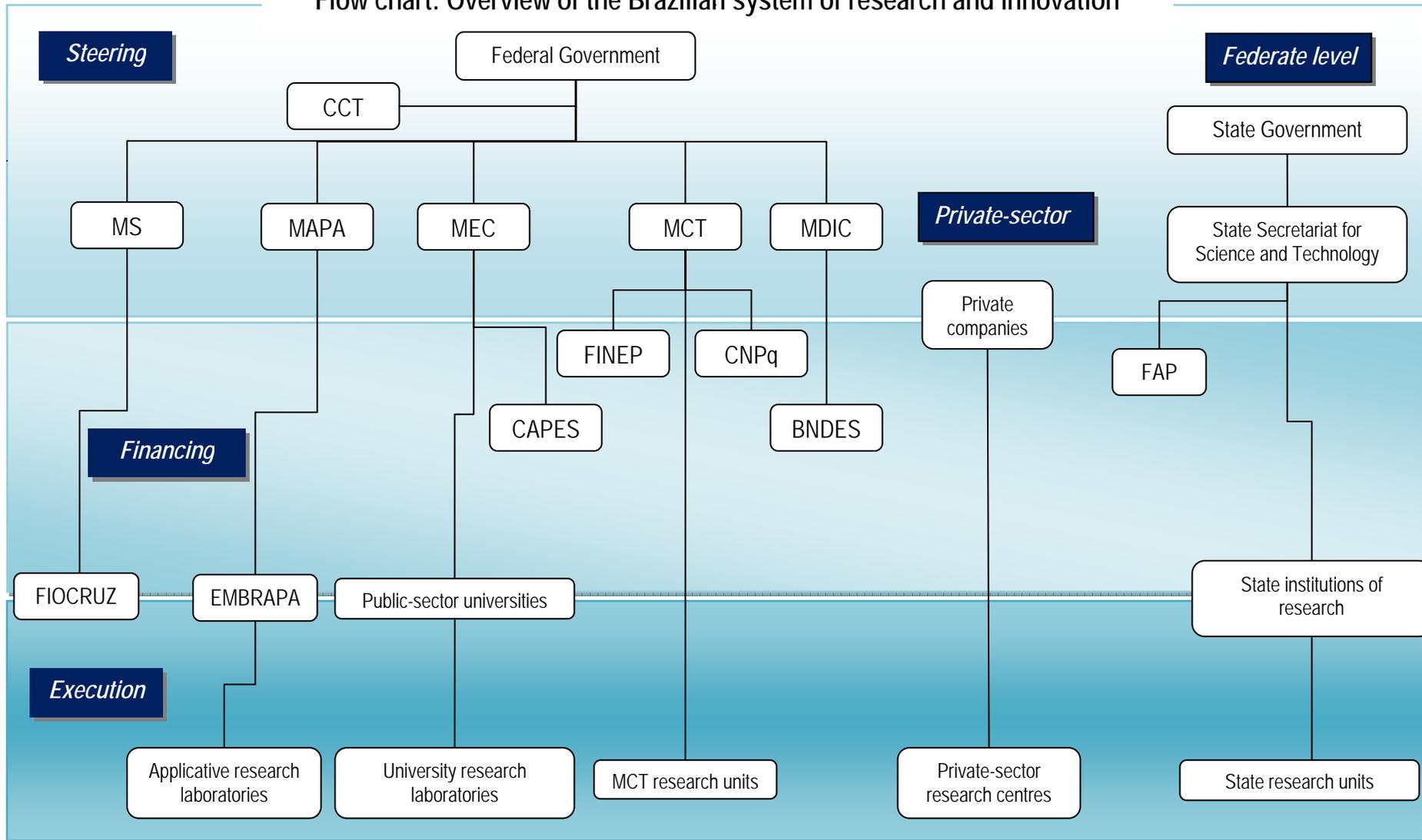
The elaboration of an organization flowchart provides a graphic picture of Brazil's national system of research. Such a chart clarifies the interactions at work between the different institutions concerned. It also aims to facilitate international comparisons.

The chart is designed to highlight the three elements in research organization - steering, funding and execution - which have been used to describe in turn all the structures of the system. The ties between the different establishments (universities and organizations) and their supervisory bodies are depicted. The federate level is also represented on the same diagram, with a State's Secretariat for science and technology taking a role equivalent to that played by the Ministry of Science and Technology (*Ministério da Ciência e da Tecnologia* – MCT, ↗ www.mct.gov.br) at national level and with the research support foundations (*Fundação de Amparo à Pesquisa - FAP*) as coordination agency. At this level, the research institutions are evidently smaller and more localized than their federal counterparts.

Particularly noticeable are the large research organizations, such as Oswaldo Cruz Foundation (*Fundação Oswaldo Cruz – FIOCRUZ*, ↗ www.fiocruz.br) or Brazilian Agricultural Research Corporation (*Empresa brasileira de pesquisa agropecuária – EMBRAPA*, ↗ www.embrapa.br), located in the funding part of the process, because at directorate-general level they play a role in programming in parallel with the agencies, by way of recurrent finance packages allocated by the supervising ministries.

¹ This document draws extensively from the 'Curie+ Recherche Leaflet', written under the chief editorship of Jean-Pierre Courtiat and produced by the French embassy in Brazil in June 2007 (first release).

Flow chart: Overview of the Brazilian system of research and innovation



II. The research operators

Research in Brazil is predominantly a public-sector activity, conducted in laboratories located in specifically-g geared establishments (the public research bodies) or in establishments of higher education and research (the universities). The latter are the main contributors, but there exist also some private universities, especially confessional ones, which contribute to the national research results.

II.1. The universities

The assessment system of the Federal Agency for Support and Evaluation of Higher Education (*Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – CAPES*, ↗www.capes.gov.br) allows a classification of the country's best universities. The federal universities are often in the leading positions. Hereafter are the best 20 Brazilian universities:²

- Universidade de São Paulo, USP, ↗ www.usp.br
- Universidade Federal do Rio de Janeiro, UFRJ, ↗ www.ufrj.br
- Universidade Estadual de Campinas, Unicamp, ↗ www.unicamp.br
- Universidade Federal do Rio Grande do Sul, UFRGS, ↗ www.ufrgs.br
- Universidade Federal de Minas Gerais, UFMG, ↗ www.ufmg.br
- Universidade Estadual Paulista Julio de Mesquita Filho, Unesp, ↗ www.unesp.br
- Universidade Federal de Santa Catarina, UFSC, ↗ www.ufsc.br
- Pontifícia Universidade Católica do Rio de Janeiro, PUC-RJ, ↗ www.puc-rio.br
- Universidade Federal de Viçosa, UFV, ↗ www.ufv.br
- Universidade de Brasília, UnB, ↗ www.unb.br
- Universidade Federal do Pernambuco, UFPe, ↗ www.ufpe.br
- Universidade Federal Fluminense, UFF, ↗ www.uff.br
- Universidade Federal de São Carlos, UFSCar, ↗ www.ufscar.br
- Universidade Federal do Paraná, UFPr, ↗ www.ufpr.br
- Pontifícia Universidade Católica de São Paulo, PUC-SP, ↗ www.pucsp.br
- Pontifícia Universidade Católica do Rio Grande do Sul, PUC-RS, ↗ www.pucrs.br
- Universidade Federal da Bahia, UFBA, ↗ www.ufba.br
- Universidade Estadual do Rio de Janeiro, UERJ, ↗ www.uerj.br
- Universidade Federal do Ceará, UFC, ↗ www.ufc.br
- Universidade Federal de Santa Maria, UFSM, ↗ www.ufsm.br

II.2. The public-sector research organizations

The greatest number of public research organizations is found at federal level and they are also the largest. Each of them is attached to a ministry. Several technical ministries thus take part in the Brazilian system of research by means of one or more partner(s). The MCT manages over 20

² The CAPES notes date from the triennial assessment (2004-2007).

units of scientific, technological and innovation research which cover Brazil's highest-priority fields of knowledge:

Brazilian Agricultural Research Corporation (*Empresa brasileira de pesquisa agropecuária – EMBRAPA*), ↗ www.embrapa.br

Oswaldo Cruz Foundation (*Fundação Oswaldo Cruz – FIOCRUZ*), ↗ www.fiocruz.br

Brazilian Centre for Physics Research (*Centro Brasileiro de Pesquisas Física – CBPF*),
↗ www.cbpf.br

Renato Archer Research Centre (*Centro de Pesquisa Renato Archer – CenPRA*),
↗ www.cenpra.gov.br

Centre for Mineral Technology (*Centro de Tecnologia Mineral – CETEM*),
↗ www.cetem.gov.br

Brazilian Institute of Science and Technology Information (*Instituto Brasileiro de Informação em Ciência e Tecnologia – IBICT*), ↗ www.ibict.br

National Institute for Research on the Amazon Region (*Instituto Nacional de Pesquisas da Amazônia – INPA*), ↗ www.inpa.gov.br

National Institute for Space Research (*Instituto Nacional de Pesquisas Espaciais – INPE*),
↗ www.inpe.br

National Institute for Semi-Arid Environments (*Instituto Nacional do Semi-Arido – INSA*)
↗ www.insa.gov.br

National Institute of Technology (*Instituto Nacional de Tecnologia – INT*), ↗ www.int.gov.br

National Observatory (*Observatório Nacional – ON*), ↗ www.on.br

Museum of Astronomy and Related Sciences (*Museu de Astronomia e Ciências Afins – MAST*)
↗ www.mast.br

Pará Emilio Goeldi Museum (*Museu Paraense Emilio Goeldi – MPEG*), ↗ www.museu-goeldi.br

National Astrophysics Laboratory (*Laboratório Nacional de Astrofísica – LNA*), ↗ www.lna.br

National Laboratory for Scientific Computing (*Laboratório Nacional de Computação Científica – LNCC*), ↗ www.lncc.br

Brazilian Synchrotron Light Laboratory (*Associação brasileira de tecnologia Luz Síncrotron – LNLS*),
↗ www.lnls.br

Mamirauá Institute for Sustainable Development (*Instituto de Desenvolvimento Sustentável Mamirauá – IDSM*), ↗ www.mamiraua.org.br

National Institute of Pure and Applied Mathematics (*Instituto de Matemática Pura e Aplicada – IMPA*), ↗ www.impa.br

National Research and Education Network (*Rede Nacional de Ensino e Pesquisa – RNP*),
↗ www.rnp.br

Nuclear Technology Development Centre (*Centro de Desenvolvimento da Tecnologia Nuclear – CDTN*)

Regional Centre of Nuclear Sciences (*Centro Regional de Ciências Nucleares – CRCN*)

Institute of Nuclear Energy (*Instituto de Engenharia Nuclear – IEN*)

Institute for Energy and Nuclear Research (*Instituto de Pesquisa Energéticas e Nucleares – IPEN*)

Institute of Radioprotection and Dosimetry (*Instituto de Radioproteção e Dosimetria – IRD*)

Public research organizations also exist by the country's various States. Some of these, mainly those located in São Paulo State, enjoy considerable renown, such as the following (in São Paulo State):

Institute of Technology Research of the State of São Paulo (*Instituto de Pesquisas Tecnológicas do Estado de São Paulo – IPT*)

Butantan Institute for Biomedical Research

Institute of Food Technology (*Instituto de Tecnologia de Alimentos – Ital*)

Campinas Institute of Agronomy (*Instituto Agrônômico de Campinas – IAC*)

In other States of the Federation:

The Science and Technology Foundation (*Fundação de Ciência e Tecnologia – Cientec*), in the State of Rio Grande do Sul

Paraná Institute of Technology (*Instituto de Tecnologia do Paraná - Tecpar*)

Minas Gerais Technological Centre Foundation (*Fundação Centro Tecnológico de Minas Gerais – Cetec*)

III. The supervisory bodies

The supervisory bodies are government structures in charge of steering public research. It is pertinent to distinguish the federal level from the federate level.

III.1. The federal level

The Ministry of Science and Technology (*Ministério de Ciência e Tecnologia - MCT*) is the main player in the promotion of research and technology in Brazil. The ministry is in particular responsible for defining and implementing the national science, technology and innovation policy (*Política Nacional de Ciência, Tecnologia e Inovação - PNCTI*).

The PNCTI was defined by the government of President Luis Inácio Lula da Silva. The MCT drives the implementation of this policy, but it was devised jointly with other ministries and the President of the Republic's Civil House (*Casa Civil*).

The Ministry of Education (*Ministério da Educação – MEC*, ↗ www.mec.gov.br) participates by means of its Higher Education Secretariat (*Secretaria de Educação Superior - SESU*) and its Evaluation agency, the CAPES.

The Ministry of Development, Industry and International Trade (*Ministério do Desenvolvimento, Indústria e Comércio Exterior – MDIC*, ↗ www.mdic.gov.br) is involved in defining the Policy for Industry, Technology and International Commerce (*Política Industrial, Tecnológica e de Comercio Exterior - PITCE*) which aims to increase the effectiveness of the productive structure, the Brazilian companies' capacity for innovation and exports.

III.2. The federate level

Every State government in Brazil has a State Secretariat for Science and Technology. These secretariats are brought together in the National Council of State Secretaries for Scientific and Technological Affairs and Innovation (*Conselho Nacional de Secretários Estaduais de Assuntos de Ciência, Tecnologia e Inovação – CONSECTI*, ↗ www.consecti.org.br). This body's principal objective is to consolidate a national system of science and technology that is unifying, yet decentralized and efficient.

IV. The intermediary structures

As for the supervisory bodies, there are two distinct political levels of operation for the intermediary structures, which include the theme-based coordination agencies (for programming and/or financing), structures geared to valorization (innovation agencies) and the assessment bodies.

IV.1. The theme-based coordination agencies

The main source of finance for science and technology managed by MCT is the National Fund for Scientific and Technological Development (*Fundo Nacional de Desenvolvimento Científico e Tecnológico* - FNDCT), which is fed largely by the sector-oriented funds.

IV.1.1. At federal level

The MCT has five agencies at hand to pursue its objectives. Two of these are geared to the financing of research: the National Council for Scientific and Technological Development (*Conselho Nacional de Desenvolvimento Científico e Tecnológico* – CNPq, ↗ www.cnpq.br) and the Studies and Projects Financing Agency (*Financiadora de Estudos e Projetos* – FINEP, ↗ www.finep.gov.br).

The CNPq is the oldest Brazilian research funding agency. It promotes and stimulates the scientific and technological development of the country and contributes to the formulation of national policies for science, technology and innovation.

The FINEP is another MCT agency. Its purpose is to promote and finance innovation and scientific and technological research in both public and private scientific and technological companies and institutions. FINEP also has the role of executive secretariat of the FNDCT and, consequently, for the sector funds (*Fundos Setoriais*).

IV.1.2. At federate level

The constitutions of most of the federate States provide for the redistribution of a percentage of the State's fiscal revenue towards science and technology research. These resources are managed by research support foundations, the FAPs, which are generally linked to the State secretariats for science and technology.

Like the State secretariats for science and technology, the research-support foundations are also brought together in a council, the National Council of State Research Support Foundations (*Conselho Nacional das Fundações Estaduais de Amparo à Pesquisa* – CONFAP, ↗ www.confap.org.br).

For many years, the federal and federate-level institutions have been operating in increasingly closely tied partnerships, building joint programmes.

IV.2. The research optimization structures

The research optimization structures in Brazil take the form of innovation agencies. The Law on Innovation, passed in December 2004 and in force since October 2005, made it compulsory for all the universities and research laboratories to set up such agencies.

All the institutions have indeed equipped themselves with optimization organs, yet such structures are still at the embryonic stage. Currently, the most substantial and dynamic is the INOVA agency (↗ www.inova.unicamp.br), attached to the University of Campinas (Unicamp).

IV.3. The assessment organizations

Generally, there is confusion of roles between the research financing and policy steering bodies and the assessment organizations.

IV.3.1. At federal level

Course and programme assessment falls to CAPES, while the assessment of the research personnel in Brazil is the responsibility of the CNPq, in line with its function as a funding agency for researchers. Research staffs are evaluated by an assessment committee. Funding is attributed (amount and duration) according to a scale taking into account a personnel category chart drawn up by the agency and an assessment of level attained.

The CNPq has in addition set up an online interface system (a database) where researchers can publish their curriculum vitae : the Lattes³ Platform. It is in practice obligatory to keep feeding and updating this interface, because only those researchers registered on it are eligible to reply to a call for proposals. Apart from that, the data available on the Lattes Platform constitute the very basis of researcher assessment.

IV.3.2. At federate level

The FAPs are assessment bodies that operate at federate State level. The procedures adopted vary widely between different FAPs, in line with the great disparities between their situations (the States' financial resources, level of technological development, degree of political interest their governments apply to science and technology, and so on).

³ <http://lattes.cnpq.br>