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Cartography of science and technology libraries in Brazil: spatial analysis as a strategy for the construction of scientific and technological information policies

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Cartography

- The cartography, art and discipline of making maps...
 - .. evolves rapidly.
- Today, high-precision software for:
 - Create a **representation**
 - Understand a **spatial distribution**
 - Know the best **way to get from one point to another.**



Significant Narratives

- Further...
 - cartography helps in the
 - ... Construction of **significant narratives**, around which:
 - Improve **planning**
 - Stimulate **reasoning**
 - Guarantee part of the cultural, scientific and technological **memory** of a social group



Cognitive Cartography

- In this perspective, the maps **are not just** ...
 - ... information through spatial representations ...
 - ... but they are the **guarantee of the construction of meaning** as ...
 - ... **basis for action.**

*It is the **Cognitive Cartography***



Repositories of Knowledge

- Maps are **repositories of knowledge**, since they are elements of storage, manipulation and dissemination of information from three possible mapping systems:
 - The map itself as **static information** store.
 - The map as an element of **input and manipulation of data** in an information system.
 - The map as a **dynamic output of an information processing** system.



Geographical Information Science

- **Cartography** is developed side by side with **geographic information systems** and **spatial data analysis**.
- Together, **Geographical Information Science**, supporting in many contexts
 - **planning**, resource management, scientific research, environmental monitoring, among others.
 - Such collaboration can have many perspectives, including the use of this **specialized information** to aid in the definition of **information policies in science and technology**.



Science and Technology Libraries Are Models

- The understanding of the relevance of the contribution of **specialized information in support of development in science and technology** led countries to organize their national ICT infrastructure, including science and technology libraries, which, in addition to the development of S & T
 - *Usually, science and technology libraries are models for other libraries with regard to the development and management of collections, provision of information services, among many other initiatives of reference...*
 - *... as now, who are leading the discussion on open data of scientific research and seeking to return to the leading role of scientific and technological research.*



Brazil Network of Libraries of Research Institutes

- In Brazil, the institution responsible for **conducting ICT policy is IBICT**, and has **numerous initiatives** in support of S & T Bibiotecas
- **Network of Libraries of Research Institutes of the Brazilian Ministry of Science, Technology and Innovation (RBP), 2009**
 - *aerospace, biodiversity, biotechnology, information science, industrial complex defense, renewable energy, pharmaceuticals and industrial health complex, productive and social inclusion, improvement of scientific education, climate change, nanotechnology, nuclear, oceans and coastal areas, oil and gas, science popularization, information and communication technologies, technologies for sustainable cities, program structuring and activities of the national science, technology and innovation strategy.*



Networks of Specialized Scientific Libraries

- In addition to the outstanding action of the IBICT, Brazil also offer numerous information services in science and technology, such as
 - **Brazilian Company of Agricultural Research Libraries System**, with 43 units, whose objective is to attend to the National System of Agricultural Research. It can be said that Embrapa's library system has helped Brazil to become a world reference in agriculture in tropical countries.
 - **Network of Libraries of the Oswaldo Cruz Foundation**, with 18 libraries, whose objective is the management, organization and dissemination of bibliographic resources and the production of health information sources. It can be said that the Fiocruz Brazil become the most prominent institution of science and technology in health in Latin America.

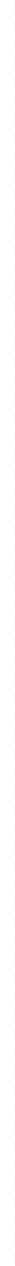


Planning of Library Infrastructures

- **Fortunately the country counts on other important initiatives, *which are not mapped in an aggregate way and therefore ...***
 - **...its current and potential joint strength is not widely known ...**
 - **...neither by universities, nor by research institutes nor by managers of science and technology.**
- *This situation makes it difficult to construct ICT policies, including the planning of library infrastructures and urgent and necessary resources in the long term.*



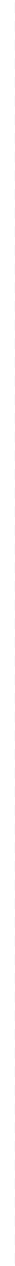
▶ **GOALS**



-
- Provide the location **map of science and technology libraries in Brazil ...**
 - in order to **assist the construction of scientific and technological information policies ...**
 - ... through the **available infrastructure and**
 - ... **geographical knowledge** of the
 - ... **spatial relations** and **possible interactions**.



▶ **METHODOLOGY**



First Specific Objective: Libraries

- Search official documents and portals of:
 - Ministry of **Education** (academic libraries and research institutes in education)
 - Ministry of **Science, Technology, Communications and Innovation** (research libraries in government bodies linked to MCTIC)
 - Ministry of **Defense** (libraries of government research institutions in national security)
 - Ministries of **Agriculture; Economy; Mines and Energy; Foreign Relations; Health**; Work to identify the libraries of other research institutes linked to the federal government.



Second Specific Objective: GIS

- The research will use the **Open Observatory System for Visualization of Information (Vision)** ...
 - ... open-source information visualization software based on **geographic location** created by Ibict to support decision making, capable of dynamically accessing the data set used.
This presentation is available in Google Earth.

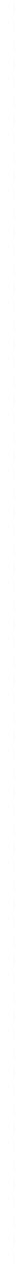


Third Specific Objective: Enable Space Analysis

- To **enable managers to analyze spatial distribution in order to obtain information relevant to information policies in science and technology ...**
- ... the project results describe spatial relationships and possible interactions.
- It is the **display of data as a means of analysis itself and of the problem.**
- It is the **information visualization approach as an instrument of action.**



▶ **RESULTS**



Federal Universities

- **Six hundred and three (603)** Libraries in **Federal Universities**
 - 16 in the Midwest Region
 - 85 in the North Region
 - 115 in the South Region
 - 188 in the Northeast Region
 - 197 in the Southeast Region



State Universities

- **Four hundred and eighty six (486)** Libraries in **State Universities**
 - 45 in the North Region
 - 60 in the Midwest Region
 - 71 in the South Region
 - 102 in the Northeast Region
 - 208 in the Southeast Region



Research Institutes

- **Two hundred and seven (207)** Libraries in **Research Institutes**
 - 14 in the South Region
 - 16 in the North Region
 - 21 in the Northeast Region
 - 36 in the Midwest Region
 - 120 in the Southeast Region



Federal Institutes

- **Five hundred and eighty six (586)** Libraries in **Federal Institutes**
 - 61 in the North Region
 - 70 in the Midwest Region
 - 109 in the South
 - 190 in the Northeast Region
 - 156 in the Southeast Region



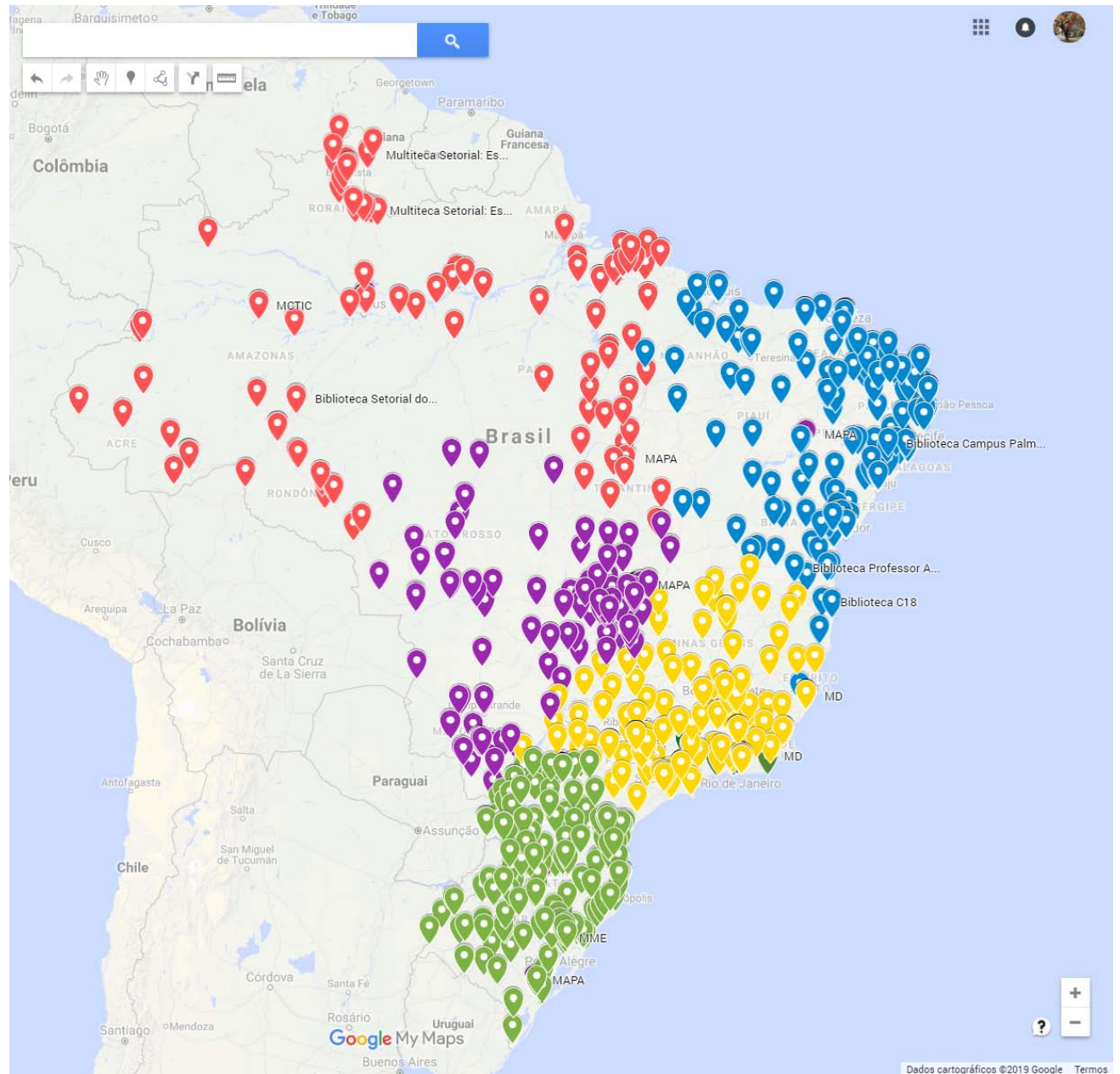
	Federal Universities	State Universities	Research Institutes	Federal Institutes
CO	20	60	36	70
	Distrito Federal 1	Distrito Federal 1	Distrito Federal 30	Distrito Federal 11
	Goiás 10	Goiás 43	Goiás 2	Goiás 27
	Mato Grosso 5	Mato Grosso 1	Mato Grosso 3	Mato Grosso 22
	Mato Grosso do Sul 4	Mato Grosso do Sul 15	Mato Grosso do Sul 1	Mato Grosso do Sul 10
NE	189	102	21	190
	Alagoas 12	Alagoas 7	Alagoas 0	Alagoas 16
	Bahia 42	Bahia 33	Bahia 3	Bahia 33
	Ceará 21	Ceará 21	Ceará 5	Ceará 34
	Maranhão 17	Maranhão 8	Maranhão 1	Maranhão 17
	Paraíba 31	Paraíba 15	Paraíba 2	Paraíba 16
	Pernambuco 21	Pernambuco 9	Pernambuco 7	Pernambuco 25
	Piauí 11	Piauí 1	Piauí 2	Piauí 17
Rio Grande do Norte 27	Rio Grande do Norte 8	Rio Grande do Norte 0	Rio Grande do Norte 23	
	Sergipe 7	Sergipe 0	Sergipe 1	Sergipe 9
N	85	45	16	61 61
	Acre 1	Acre 0	Acre 1	Acre 6
	Amazonas 13	Amazonas 10	Amazonas 7	Amazonas 15
	Amapá 1	Amapá 1	Amapá 1	Amapá 1
	Pará 51	Pará 20	Pará 3	Pará 18
	Rondônia 8	Rondônia 0	Rondônia 2	Rondônia 8
	Roraima 3	Roraima 13	Roraima 1	Roraima 5
	Tocantins 8	Tocantins 1	Tocantins 1	Tocantins 8
SE	197	208	120	156
	Espírito Santo 9	Espírito Santo 0	Espírito Santo 2	Espírito Santo 22
	Minas Gerais 89	Minas Gerais 37	Minas Gerais 11	Minas Gerais 64
	Rio de Janeiro 86	Rio de Janeiro 35	Rio de Janeiro 80	Rio de Janeiro 28
	São Paulo 13	São Paulo 136	São Paulo 27	São Paulo 42
S	126	71	14	109
	Paraná 37	Paraná 55	Paraná 5	Paraná 27
	Rio Grande do Sul 77	Rio Grande do Sul 4	Rio Grande do Sul 5	Rio Grande do Sul 43
	Santa Catarina 12	Santa Catarina 12	Santa Catarina 4	Santa Catarina 39
T	617	486	207	586
TOTAL = One thousand, eight hundred and ninety-six (1.896)				

Brazil



Source: <http://www.mapas-brasil.net/>

Coverage of
Science and Technology
Libraries in Brazil



▶ **Final Considerations**

Power

- Geographic Information Science is a **computerized decision-making system**.
- Its growing importance now lies in so-called ***Cognitive Cartography***....
 - ... used for the **construction of narratives for the exercise of power** ...
 - ... expressing **specific interests and** for a **political purpose**.



Construction of Information Policies in Science and Technology

- Increasing awareness of how the distribution of science and technology libraries of all country initiatives presented in aggregate is.
 - ... **provides the managers with the necessary analysis conditions to assist in the construction of information policies in science and technology in Brazil ...**
 - ... especially with regard to the infrastructures of specialized libraries in the subjects of Brazilian science and technology and the necessary resources.



Information and Interaction Platform

- In this study, maps of science and technology libraries **were presented as an information and interaction platform.**
- Henceforth it should be done in a **collaborative way**, in order to contextualize all libraries and identify realities that will arise from this product in permanent evolution.



Never Complete

- The maps are **never fully formed and your work is never complete**.
- They are ***transient and fleeting, relational and context dependent***.
- The result of the cartography, titled Map of the Libraries of Science and Technology in Brazil is available at URL **<http://ibict.br/>**



Uninterrupted Social Construction

- The secondary results of this work was to produce a **cartography of Brazilian science and technology ...**
 - ... based on the installed physical infrastructure of available scientific and technological knowledge ...
 - empowering and emancipatory ...
 - ***... considering it as an uninterrupted social construction, which not only represents this reality, but mainly, that produces it.***



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