

Symposium on Excellence in Higher Education

BRAZIL, WORLD CLASS UNIVERSITIES AND EXCELLENCE IN RESEARCH

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Context

- 1) Universities constitute a **wide spectrum of Institutions**;
- 2) **Basic Research** is mainly produced **in Research Universities** by graduates and PosDocs;
- 3) **Some non Research** Universities **contribute** to Research
- 4) Maintaining a World Class University (**WCU**) requires the best **Academic Leadership at all levels**;
- 5) **Public Funding** of research in a WCU is **essential**;
- 6) **Excellence in research** within a WCU **is related to, but not absolutely dependent of, the Policy of Research Funding agents**, and it also depends on academic leadership.
- 7) **Governance** in a WCU **MUST** be compatible with the search and maintenance of **excellence in research, teaching and community services**.

INSTITUTIONS NAMED “UNIVERSITY” COVER A WIDE SPECTRAL RANGE

UNIP

**190 000 students
Largest Brazilian
University,
39 indexed
papers**

HARVARD

Liberty with Diversity

- Many institutions **can do better concentrating** on building departments, institutes and/or world-class schools, especially in fields that are **relevant to the national economy or regional or local society**.
- Placing **too much emphasis on achieving world-class status for all** institutions can impair a university or an academic system.
- **Energy and resources** can be **diverted** from more important and perhaps more realistic goals.
- **Unrealistic expectations** can interfere with faculty and students and **impair its performance**.



Think butterflies are beautiful?
Imagine how they`d look if they were
all exactly the same

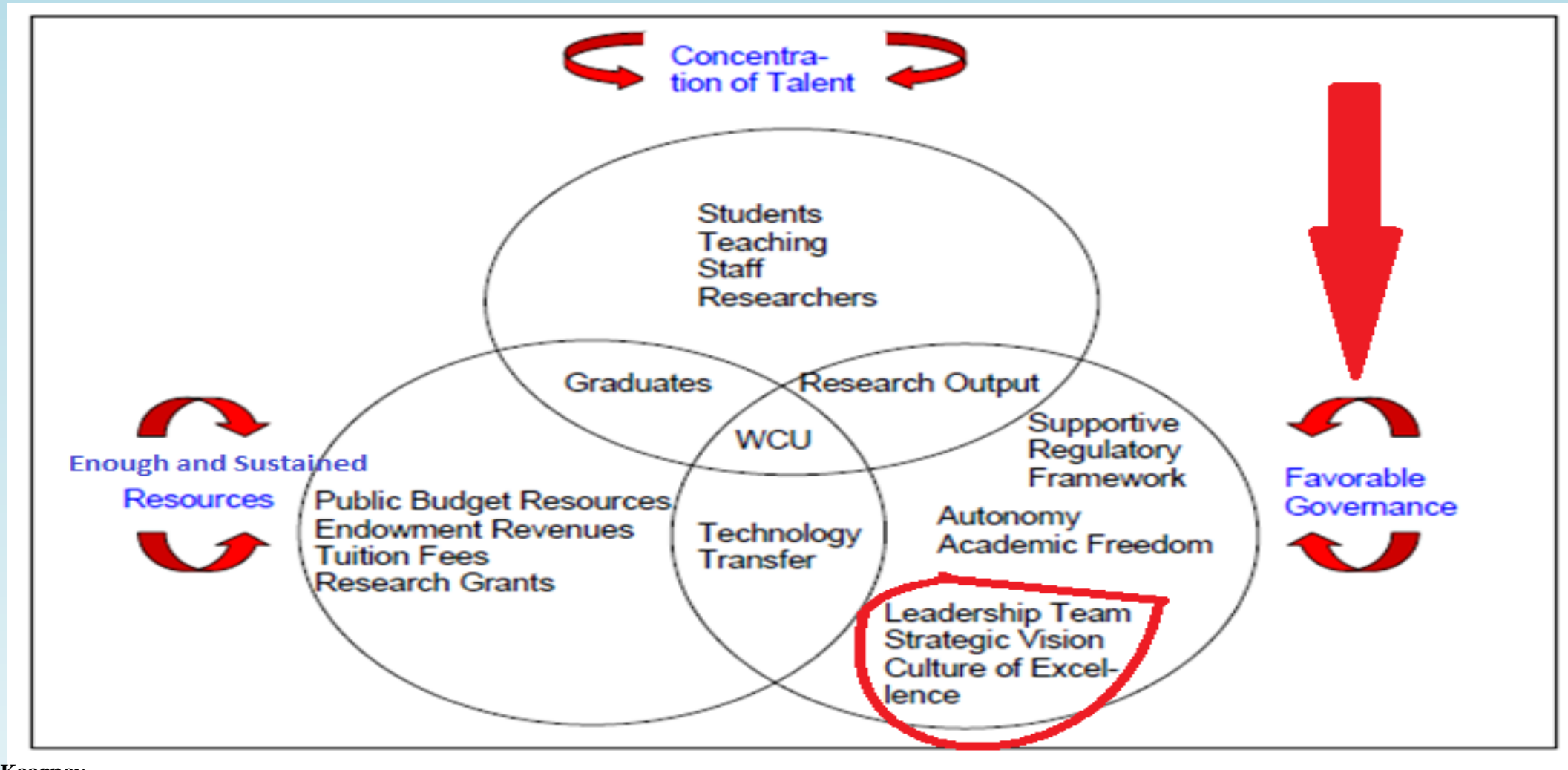
Features of a World Class University (WCU)

- **Excellence** in research;
- Academic **freedom** and an **atmosphere** of intellectual excitement;
- **Adequate facilities** for academic work to support university **research and teaching**, as well as its other functions, and support should be consistent and long term;
- The **governance** of the institution is essential;
- **Academic Leadership** at all levels.

Other features of WCU's

- WCU's develop **world-class science** and **technology**, but also **culture**, general **education**, knowledge and ability to **understand what is happening in the country and the world**;
- WCU's form **professionals, researchers, professors, diplomats, officials, politicians, journalists, historians**;
- WCU's serve as a **bridge** of contact and communication between the **country and the world**, and **benchmark** quality and relevance for other institutions.

Important Factors in a WCU



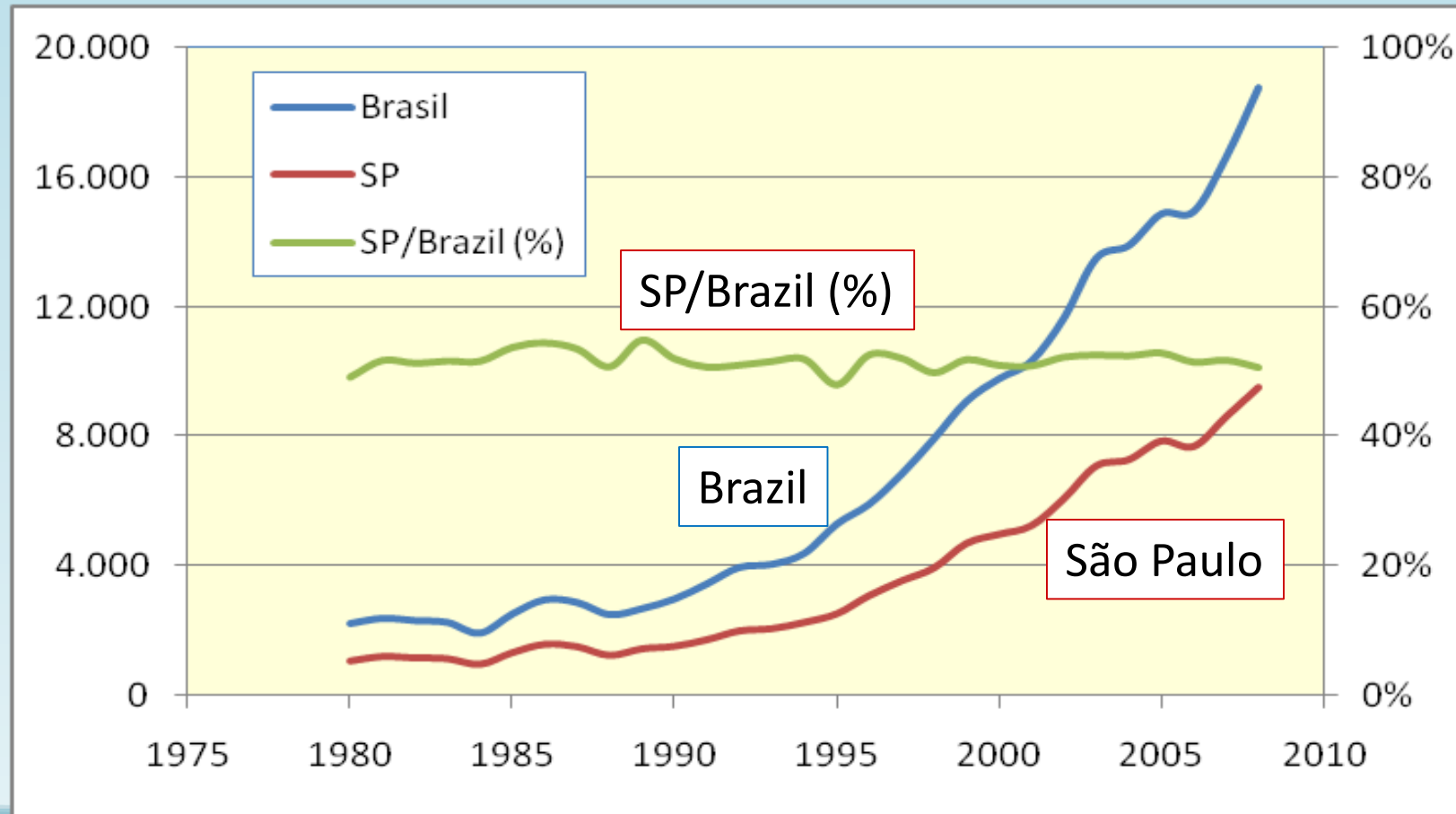
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Governance

The general definition of governance refers to:

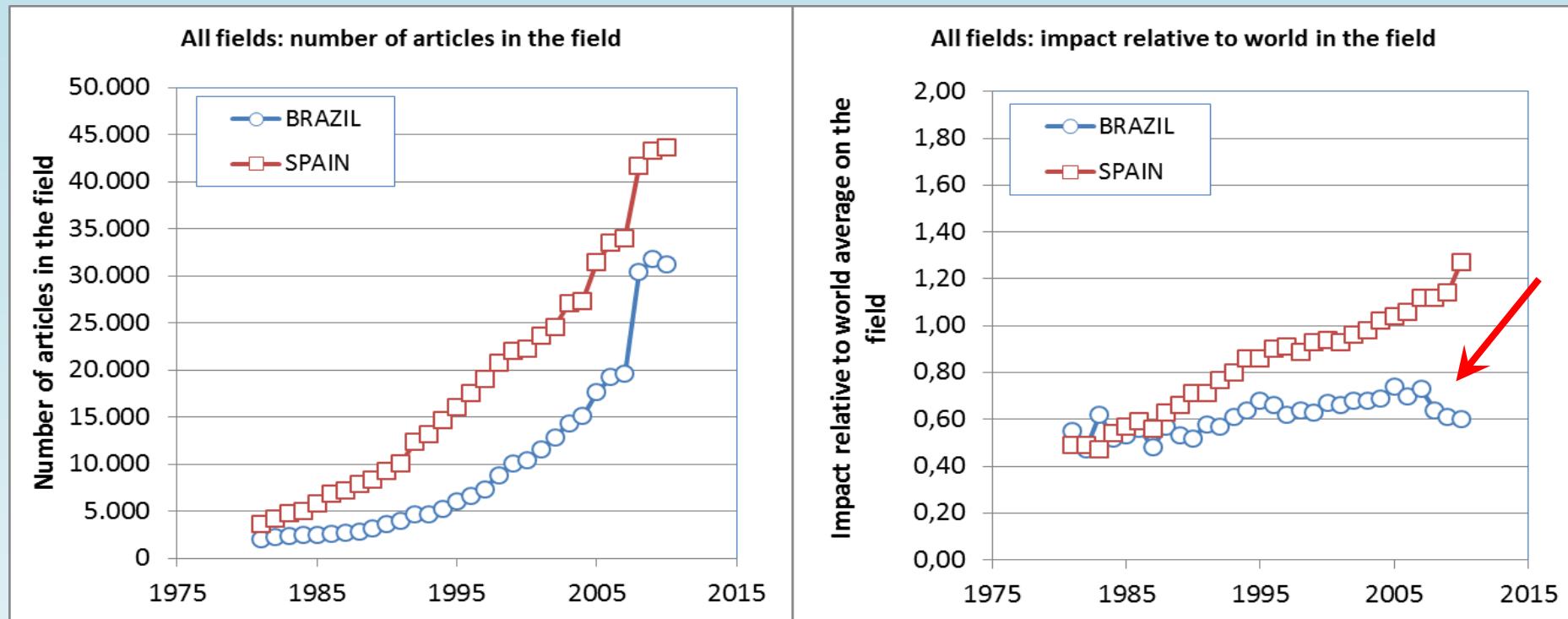
- the distribution of **authority** and functions among units within a larger entity;
- the modes of **communication and control** between them;
- the conduct of **relations** between the entity and the surrounding **environment**;
- Brazil should recognize that the number of potential WCU's does not correspond to the total number of institutions designated as universities;
- WCU's require a compatible governance system!

Brazil: scientific output grows



Articles and their impact Brazil and Spain, 1981-2010

But the impact



Fonte: Thomson-Reuters NSI 2010

Publications and PhD's



Brazilian Publications are produced by a limited number of Universities

Web of Science Documents (2009 – 2012)

Institution	Total	Intl Only	% Intl
UNIV SAO PAULO	31.571	9.347	29,61%
UNIV FED RIO DE JANEIRO	9.187	3.062	33,33%
UNIV ESTADUAL CAMPINAS	10.082	2.428	24,08%
UNIV ESTADUAL PAULISTA	11.452	2.413	21,07%
UNIV FED RIO GRANDE SUL	8.048	1.959	24,34%
UNIV FED MINAS GERAIS	7.112	1.872	26,32%
UNIV FED SAO PAULO	6.248	1.491	23,86%
UNIV FED SANTA CATARINA	4.156	1.081	26,01%
SUM	87.856	23.653	
TOTAL	157.234	40.583	

% of indexed documents by these
nine Universities

56

58

Rankings of Brazilian papers by quantity of publications in each area and Scientific Impact relative to the world. Ordered by the ratio (No of papers/scientific impact) (R1/R2)

Area	Ranking by No of Papers (R1)	Ranking by Cites/Paper (R2)	R1/R2
Economics and Business	30	63	0,48
Mathematics	15	36	0,42
Engineering	19	48	0,40
Material Sciences	19	50	0,38
Computer Science	20	54	0,37
Chemistry	15	45	0,33
Physics	16	48	0,33
Geosciences	17	56	0,30
Environment and Ecology	13	62	0,21
Immunology	14	73	0,19
Multidisciplinary	12	65	0,18
Molecular Biology and Genetics	15	83	0,18
Biology and Biochemistry	13	74	0,18
Neurosciences and Behaviour	12	69	0,17
Microbiology	12	71	0,17
Pharmacology and Toxicology	11	66	0,17
Clinical Medicine	14	87	0,16
Plant and Animal Sciences	5	98	0,05
Agricultural Sciences	2	95	0,02

Source Web of Science, Citation Rankings, 2003-2013

Keywords, % contribution and impact

Keyword(s) Years		No of Documents	% Brazil	Cites/Document	h
Sugarcane or sugar cane 2004-2014	World	9041		7,01	75
	Brazil	2857	31,6	5,69	44
Chagas 2004-2014	World	5613		9,72	71
	Brazil	2450	43,6	9,02	50
Ionic Liquids 2009-2010	World	8577		16,98	107
	Brazil	181	2,1	16,22	27
Quantum entanglement 2008-2014	World	9845		9,26	102
	Brazil	324	3,3	11,69	27
Oxidative Stress (Bio. Mol. Biol, Art.) 2010-2014	World	8016		4,02	41
	Brazil	318	4,0	2,33	9
NanoScience Nanotech 2004-2014	World	5425		19,34	121
	Brazil	64	1,2	6,84	14

Source: Web of Science

Excellence in Science

Hot Papers with Brazilian Authors, last two years

OBSERVATION OF A NEW PARTICLE IN THE SEARCH FOR THE STANDARD MODEL HIGGS BOSON WITH THE ATLAS DETECTOR AT THE LHC

646 citations, >200 Authors, Atlas Collaboration

QUANTIFYING DEFECTS IN GRAPHENE VIA RAMAN SPECTROSCOPY AT DIFFERENT EXCITATION ENERGIES

110 Citations, 10 Authors, 1 from England, Corresponding author, Brazil

Source: Web of Science

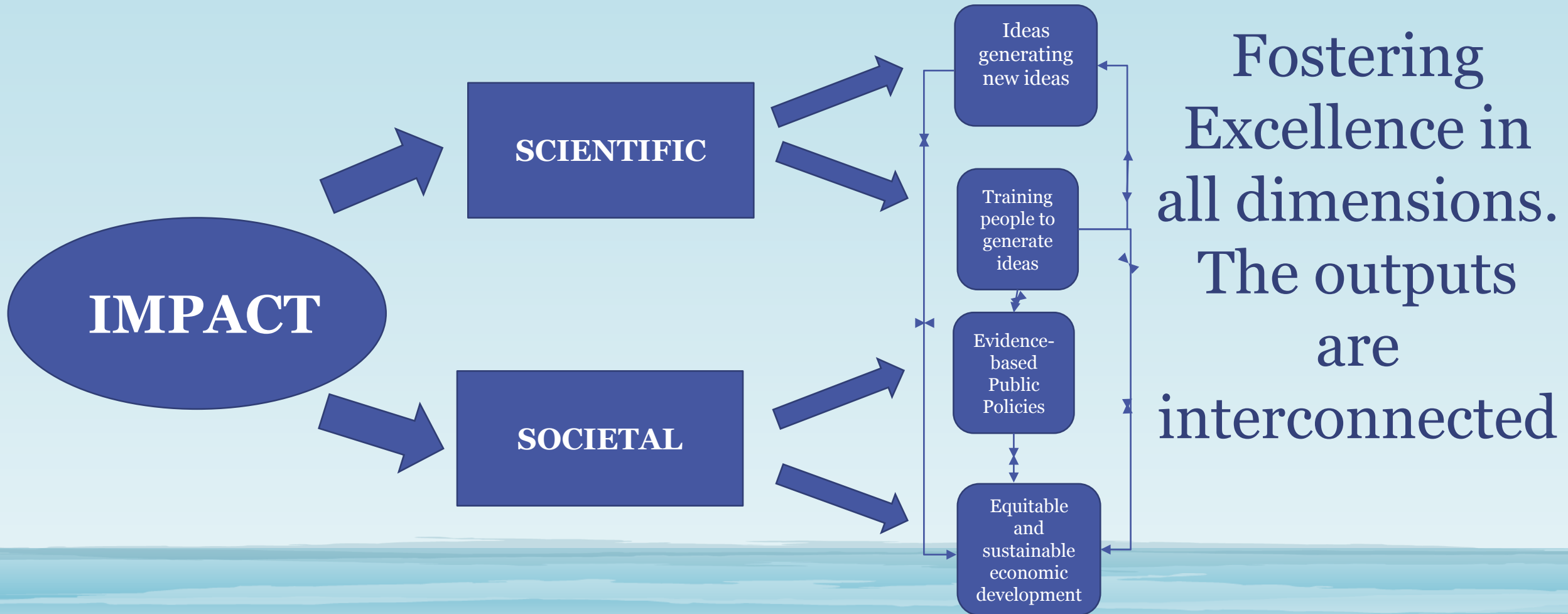
A Department with CAPES Maximum Grade International Comparison

University	Number of Faculty	Publications 2009	Publications/ Faculty	Citations/ Publication
MIT	26	96	3,7	90,65
Stanford	54	216	4,0	74,84
Caltech	53	175	3,3	83,55
UC San Francisco	63	100	1,6	82,30
Stanford	20	19	1,0	83,05
UC Berkeley	42	108	2,6	124,75
Harvard	54	94	1,7	168,71
Wisconsin-Madison	64	161	2,5	70,78
Baylor	48	130	2,7	67,32
Vanderbilt	77	153	2,0	64,38
Penn State	58	145	2,5	48,72
USP	41	142	3,5	41,57

Estimating Research Relevance

- *A system of quality indicators must comprise both output indicators and esteem indicators (indicators that express previous assessment by peers and recognition by the scientific community);*
- *A system of quality indicators must be wide-ranging enough to take account not only of scientific/scholarly quality but also of societal relevance;*
- *The scope of a good system of quality indicators should not impair practicality;*
- *The system must be flexible enough to make a tailor-made approach possible in specific contexts;*
- *The system of quality indicators must be open to adjustment or revision once the consequences of digitisation for research practices have become fully clear.*

“Impact” of research output



Assessment criteria

Diagram. Six assessment criteria

		QUALITY DOMAINS	
		SCIENTIFIC QUALITY: Conducting scientific research: carrying out research within the context of the research organisation and ensuring that peers consider this research of outstanding quality	SOCIETAL RELEVANCE: Communicating and/or collaborating with external target groups about one's own peer-reviewed research
ASSESSMENT DIMENSIONS	DEMONSTRABLE OUTPUT	(1) Demonstrable output that peers regard as of outstanding quality	(4) Demonstrable output for external target groups
	DEMONSTRABLE UTILISATION	(2) Demonstrable utilisation by peers of researcher's output	(5) Demonstrable utilisation by external target groups
	DEMONSTRABLE RECOGNITION	(3) Demonstrable recognition by peers for researcher's output	(6) Demonstrable recognition by external target groups

EXAMPLES OF SCIENTIFIC IMPACT

Citations

[Multipotent mesenchymal stromal cells obtained from diverse human tissues share functional properties and gene-expression profile with CD146\(+\) perivascular cells and fibroblasts](#)

Covas, Dimas T.; Panepucci, Rodrigo A.; Fontes, Aparecida M.; **Zago MA.**: EXPERIMENTAL HEMATOLOGY Volume: 36 Issue: 5 Pages: 642-654: MAY 2008

157

[Influence of microwave heating on the growth of gadolinium-doped cerium oxide nanorods](#): Godinho, Mario; Ribeiro, Cane; **Longo, Elson**; CRYSTAL GROWTH & DESIGN 8 (2): 384-386, 2008

56

[Observation of ultracold ground-state heteronuclear molecules](#): Mancini, MW; Telles, GD; Caires, ARL; **Bagnato VS.** PHYSICAL REVIEW LETTERS Volume: 92(13) ANo 133203, 2004

124

[Physiology of the prion protein](#): Linden, Rafael; Martins, Vilma R.; Prado, Marco A. M.; **Brentani R** PHYSIOLOGICAL REVIEWS Volume: 88 Issue: 2 Pages: 673- 728 2008

185

[A multifaceted analysis of viperid snake venoms by two-dimensional gel electrophoresis: An approach to understanding venom proteomics](#) : Serrano, SMT; Shannon, JD; Wang, DY; **Camargo ACM** et al. PROTEOMICS Volume: 5 Issue: 2 Pages: 501-510, 2005

81

[Multipotent stem cells from umbilical cord: Cord is richer than blood!](#) Secco, Mariane; Zucconi, Eder; Vieira, Natassia M.; **Zatz M** et al. STEM CELLS Volume: 26 (1) Pages: 146-150, 2008

120

Stimulated Brillouin scattering from multi-GHz-guided acoustic phonons in nanostructured photonic crystal fibres: [Dainese, P](#) (Dainese, P); [Russell, PSJ](#) (Russell, PSJ); [Joly, N](#) (Joly, N); [Knight, JC](#) (Knight, JC);

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[Wiederhecker, GS](#) (Wiederhecker, GS); [Fragnito, HL](#) (Fragnito, HL); [Laude, V](#) (Laude, V); [Khelif, A](#)(Khelif, A): NATURE PHYSICS Volume: 2 Issue: 6 Pages: 388-392, 2006

Endocrinological and catecholaminergic alterations during sleep deprivation and recovery in male rats

[Andersen, ML](#) (Andersen, ML); [Martins, PJF](#) ; [D'Almeida, V](#) ; [Bignotto, M](#) (Bignotto, M); **TUFIK, S** JOURNAL OF SLEEP RESEARCH 14 (1)Pages: 83-90, 2005 :

99

: [Virtual screening and its integration with modern drug design technologies](#) Guido, Rafael V. C.; **Oliva, Glaucius**; Andricopulo, Adriano D. CURRENT MEDICINAL CHEMISTRY 15,: 37-46, 2008

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Example of Societal Impacts

Results Obtained in Innovation with support from FAPESP / CEPID the "Multidisciplinary Center for Development of Ceramic Materials" - 2000/2013.

Start-up companies created from the center

Nanox Intelligent Materials, 6 employees, 1 million / year

Aptor Software, 10 employees, 400,000 / year

KosmoScience Cosmetic Science and Technology, 32 employees, 5.8 million / year

Companies supported by the center and the purpose of this support in economic or social terms (jobs, regional development) , Ceramic Santa Gertrudes , Polo Ceramic Porto Ferreira, Polo Ceramic Quarry, Angelus , Faber Castell, Praxair Industrial Gases, CSN
31 Patents applied for and / or licensed.

Contracts and cooperation agreements signed with companies (in this case useful indicators to measure them would be the number of contracts and the total amount paid by companies). R \$ 20,006,800

Examples of Societal Impacts

CEPID , Center for the Study of Violence at USP , 2000-2013

Knowledge transfer to bodies of state , municipal, or federal government and have social and / or economic impact .

Development of specific techniques and procedures and knowledge transfer / methodology for technical teams of government.

Projects to prevent violence against children based on the recommendations of the " World report on violence against children .“

International seminars highlighted in CEPID

Dissemination of knowledge through the media and internet .

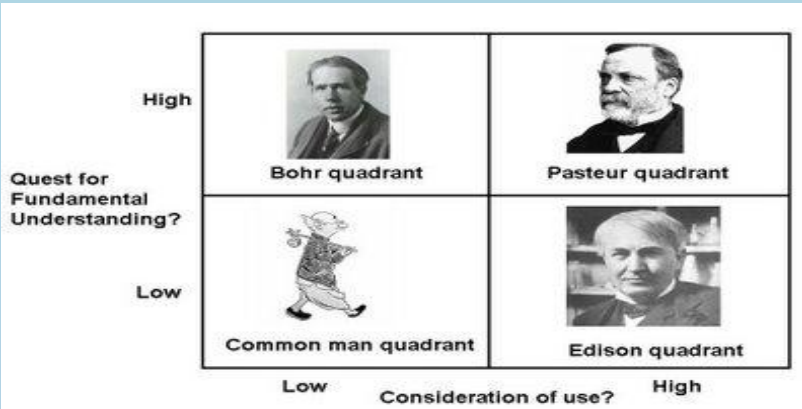
Impact of the sites linked to NEV - USP

Institutional website NEV (www.nevusp.org) (between 2008 and 2012) : 1,410,839 visits . Site Guide to Rights (<http://www.infanciasaudavel.org/>) (between 2008 and 2012) : 9,011,115 visits .

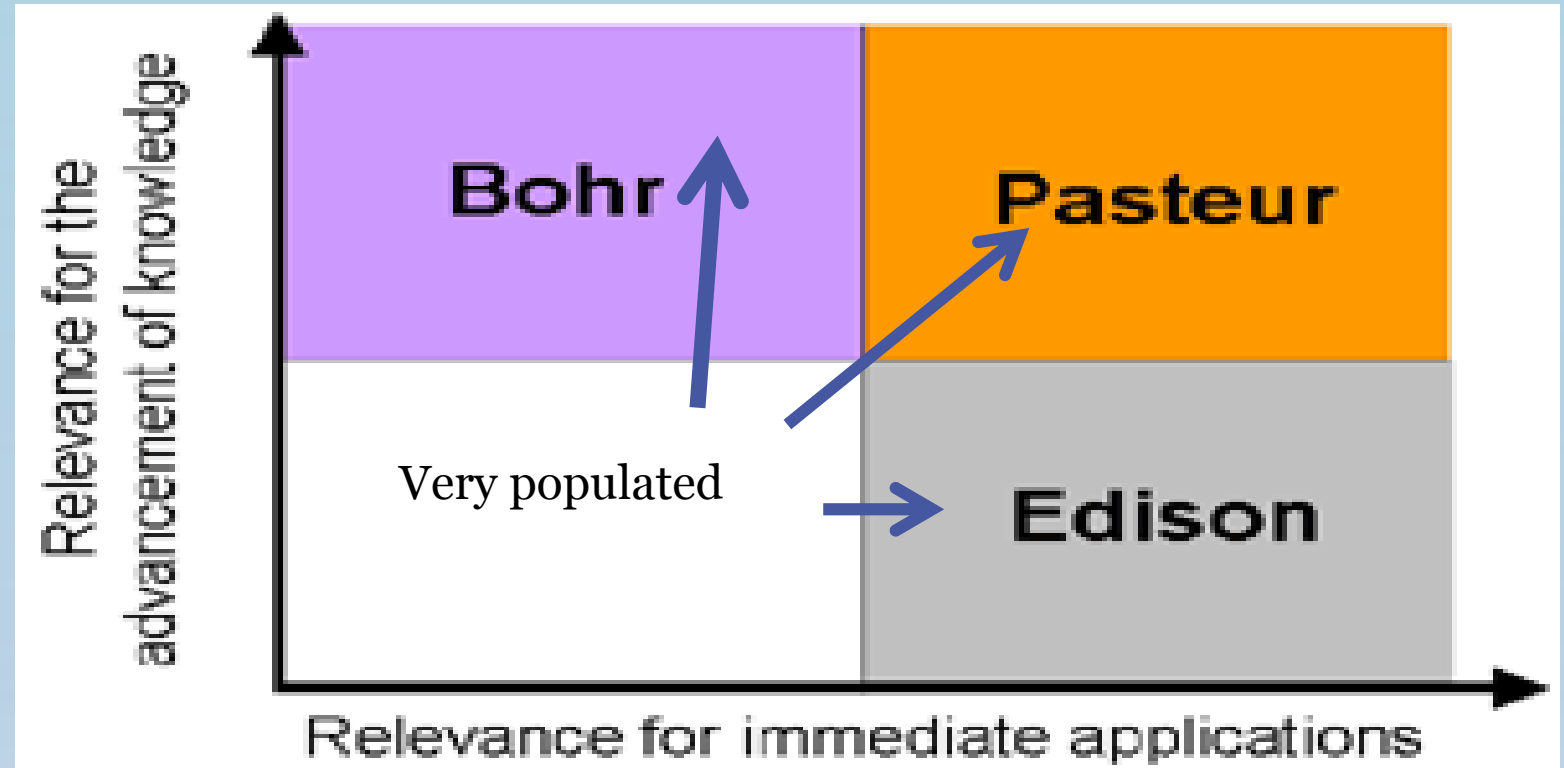
Media interventions over the period 2135. The NEV - USP held from 2001 to 2012 an average of 177.9 operations per year in the press , which is approximately equivalent to an intervention every two days in the last twelve years.

Courses for the area of criminal justice = 250

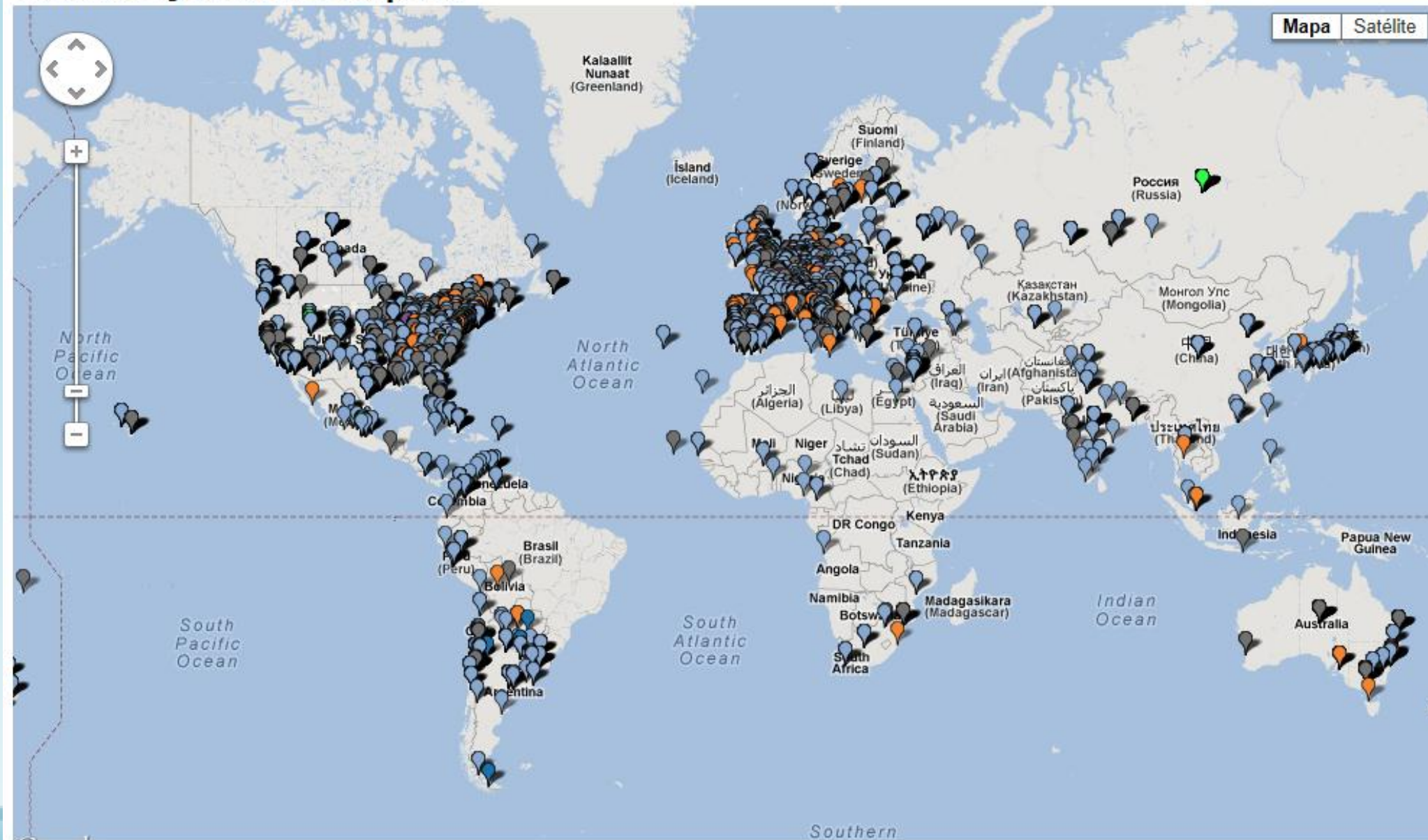
Pasteur Quadrants



Necessary
Movements
towards WCU's in
Brazil



Colaborações em Pesquisa



A WAY TO CONCLUDE

BRAZIL:

- CAN WITH AVAILABLE EXPERIENCE, LOCAL AND INTERNATIONAL, **EVALUATE, FOSTER AND REWARD EXCELLENCE IN RESEARCH;**
- CAN WITH AVAILABLE EXPERIENCE, LOCAL AND INTERNATIONAL, **EVALUATE, FOSTER AND REWARD ACADEMIC IMPACT;**
- CAN DEFINE **WORLD CLASS UNIVERSITIES (WCU) STATUS;**
- MAY RECOGNIZE THAT **THE NUMBER OF LOCAL POTENTIAL WCU'S, AT THIS MOMENT, DOES NOT CORRESPOND TO THE TOTAL NUMBER OF INSTITUTIONS LABELLED AS UNIVERSITIES (> 300);**
- MAY RECOGNIZE THAT AS WCU'S **REQUIRE A COMPATIBLE GOVERNANCE SYSTEM, ISONOMY IS NOT ADEQUATE TO BUILD AND MAINTAIN WCU STATUS;**
- PATHWAYS TO ATTAIN WCU STATUS SHOULD BE CLEAR.



The end