

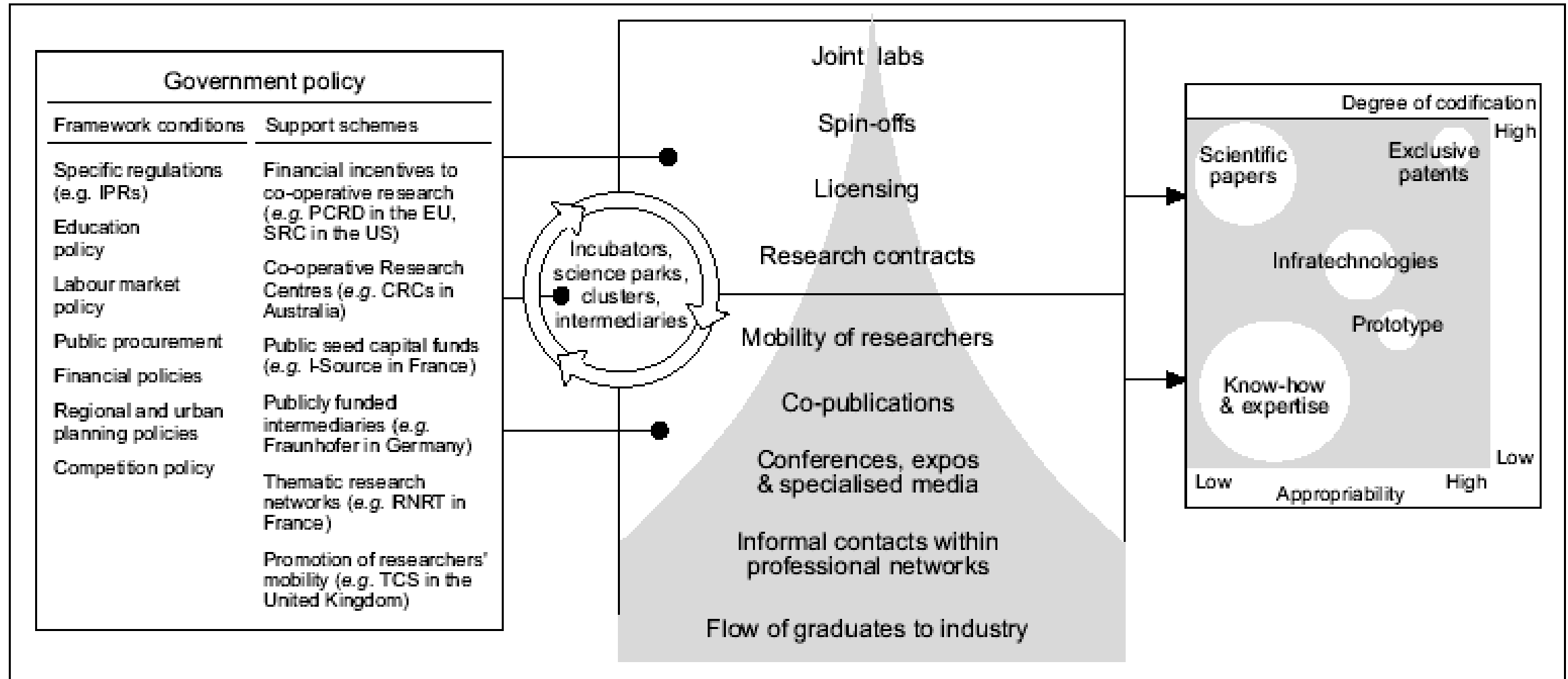
University-Industry (U-I) Cooperation: Reflections on the cases of Brazil and São Paulo

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Key Innovation Policy Trends

- Increased spending on R&D (public and private)
 - Curiosity driven research, but also use oriented research
 - Convergence between S&T policies and the economic agenda
 - Greater involvement of private actors (decision-making, planning, etc.)
 - Incentives for companies to increase their spending on R&D
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- Incentives for cooperation and new institutional forms of PPPs
 - Systemic vision – national innovation systems – companies as the main actors but understanding the complexity of interactions between institutions and companies ('networking', 'clusters', etc.)

Formal and Informal Science-Industry Relations Mechanisms (OECD)



Partnerships: an imperative



*Eindhoven (Philips):
from a Private Laboratory to a Technological
Campus*
Apud Cesar Vonniger



Science-Industry Relations: a long history

- Agricultural Colleges
 - Medical Research at Medical Schools
 - Chemistry Industry
 - Big Science – Manhattan Project
 - The Golden Age after Sputnik
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- But is very clear that something change in the 80's:
 - Emphasis on cooperation and Public Private interactions
 - National Innovation Systems
 - Open Science
 - The complexity of actors and institutions

USA: Enforcement of Technology Transfer

- 1980 - Technology Innovation Act: TT as mission of national laboratories.**
- 1980 - Bayh-Dole Act: Makes it easier to commercialize IP.**
- 1982 - Small Business Innovation Act: SBIR.**
- 1984 - National Cooperative Research Act, 1984: encourages pre-competitive R&D**
- 1984 - Patent Clarification Act: facilitates TT.**
- 1986 - Federal Technology Transfer Act: CRADAs**
- 1988 - Omnibus Trade and Competitiveness Act: PPP**
- 1989 - National Competitiveness TT Act, 1989: CRADA.**
- 1992 - Small Business Innovation: SBIR and STTR.**
- 1993 - National Cooperative R&P Act, 1993: PPP.**
- 1995 - National TT Advancement Act, 1995: CRADA.**
- 2000 - TT Commercialization Act, 2000: CRADAs.**
- 2011 - Presidential Memorandum, Goals for TT and PPP**

Innovation: The Role of University-Industry Cooperation

- Innovation requires interaction: of these, the university-business relationship is the one that stands out the most, due to the increasing scientific content of technological innovations, even non-disruptive ones.
- “The background for the discussions has usually been the assumption that this co-operation is too weakly developed, and therefore needs to be stimulated. Often one has seen the universities’ Ivory Tower-like character as the main cause of the lack of co-operation”, Lundvall, B. A., “The University in the Learning Economy”, 2002, DRUID, WP.

But Universities are not a substitute for Private R&D

- “What university research most often does today is to stimulate and enhance the power of R&D done in industry, as contrasted with providing a substitute for it. By far the largest share of the work involved in creating and bringing to practice new industrial technology is carried out in industry, not in universities.”

U-I: Complex Relationship in any Country

- “Universities also have adjusted to this new environment (technology transfer & collaborative research activities with industry).
- (...)
- At the same time, collaborative networks are not without risks. Unintended transfer of proprietary technology is always a concern for businesses. Cultural differences among different industries, academic or government partners, or international collaborators present additional difficulties for managing alliances...” (SEI, NSF, 2002)

U-I in Brazil: A complex relationship

- In Brazil, this is a very complex relationship: it involves personnel training and interfaces of the most varied types, from informal to much more sophisticated cooperative arrangements.
- University-business interaction in Brazil is not weak. It can be difficult, due to several vicissitudes of both actors, such as the public nature of the main universities, the economic context, such as the reduction of the weight of industry in the product and the systemic aspects that affect competitiveness.

Brazil: Frequency of Cooperation

- The Brazilian Survey on Innovation (Pintec) shows that, for innovative companies that cooperate to innovate, Universities are important, but they are mentioned with a frequency that is not high.

	Empresas que Inovam		Empresas que Cooperam		Relação A/B
	Alta (%)	Baixa (%)	Alta A (%)	Baixa B (%)	Alta/Baixa
Relação de Cooperação	16,0%	16,0%	100,0%	100,0%	
Fornecedores	8,5%	3,8%	53,3%	23,4%	2,3
Clientes ou consumidores	6,8%	6,5%	42,2%	40,6%	1
Outra empresa do grupo	0,9%	1,4%	5,7%	8,8%	0,6
Universidades e institutos	3,0%	11,2%	18,9%	69,7%	0,3
Instituições de testes e ensaios	3,0%	10,4%	18,5%	64,7%	0,3
Centros de capacitação profissional	3,0%	10,4%	18,6%	64,7%	0,3
Concorrentes	1,8%	11,9%	11,5%	74,1%	0,2
Empresas de consultoria	2,3%	11,4%	14,4%	70,9%	0,2

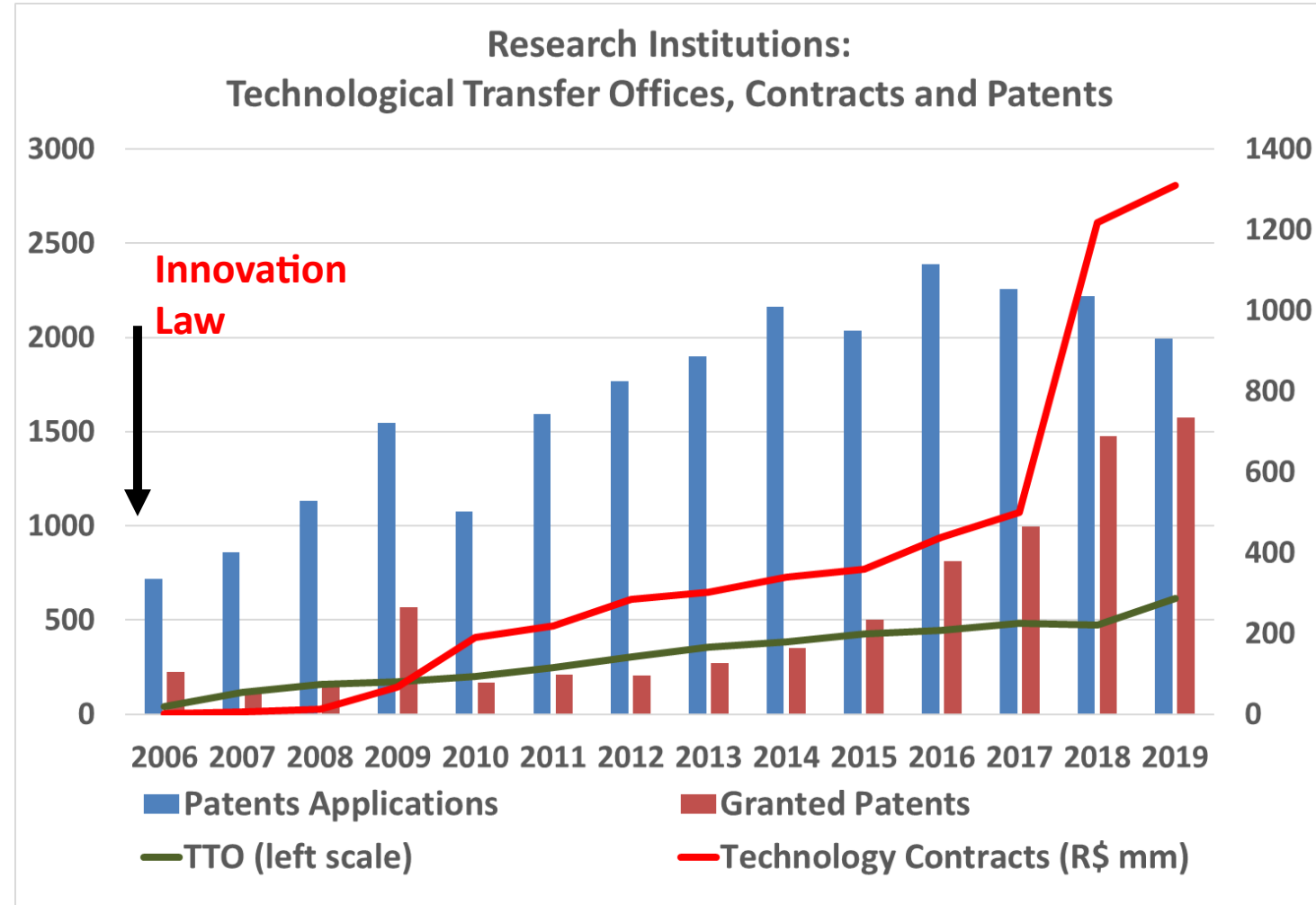
Brazil U-I: Relationship channels

- Surveys on sources used show that universities are important, but not the main source of innovation. Among the information channels, the public domain stands out: articles, reports, conferences and informal relationships. Consulting, research contracts and staff hiring appear next. Patents and technology licensing are cited by fewer companies.

Canais	Índia	China	Brasil	USA
<i>Publicações e relatórios</i>	66,6	43,0	69,4	41,2
<i>Informações informais</i>	52,3	39,1	61,7	35,6
<i>Conferências públicas</i>	60,7	36,4	61,4	35,1
<i>Consultoria de pesquisadores</i>	48,3	52,6	52,5	31,8
<i>Contratos de pesquisas</i>	45,5	52,6	54,3	20,9
<i>Contratação de pós-graduados</i>	48,5	52,6	62,7	19,6
<i>Projetos de P&D cooperativos</i>	45,0	63,9	68,2	17,9
<i>Patentes</i>	49,4	57,6	33,0	17,5
<i>Licenciamento de Tecnologia</i>	49,4	58,9	33,0	9,5
<i>Mobilidade de pessoal</i>	37,9	39,7	33,0	5,8

Brazil: The Innovation Law (2004)

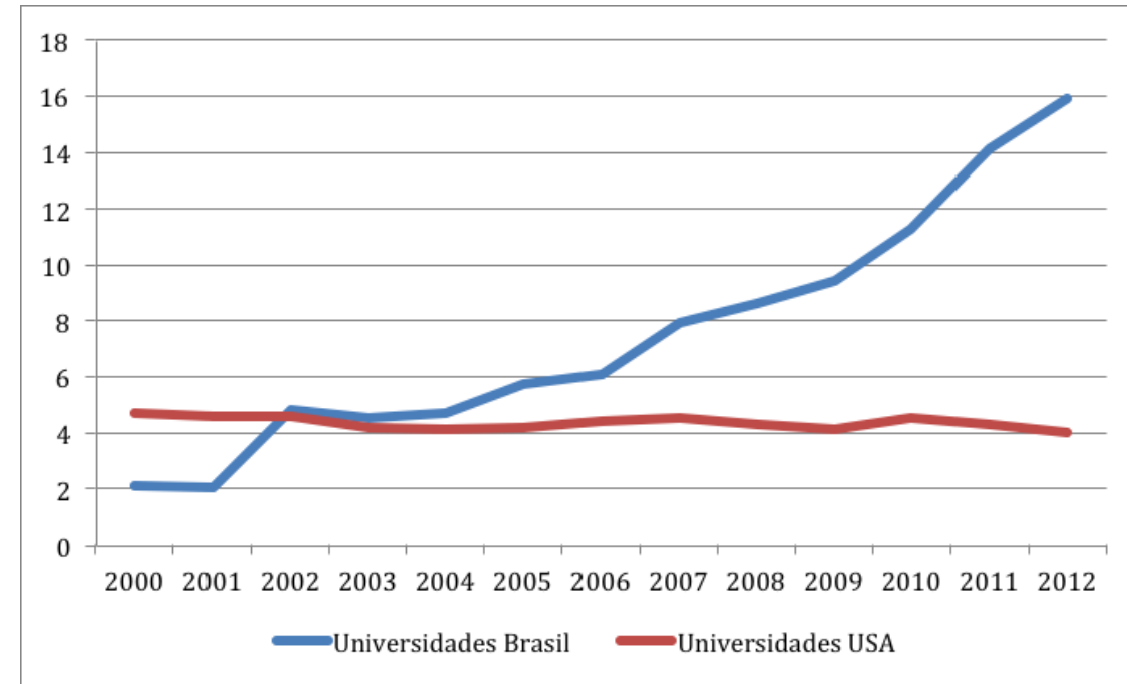
- Universities responded very well to the changes proposed by the Innovation Law.
- The implementation of Technological Innovation Centers (NITs) and intellectual property policies strengthened cooperation strategies.



Universities & Innovation Law: Growth of Patents

- In the US, there is a small decline in the percentage of universities patents. In Brazil, these percentages are increasing.
- The Brazilian performance is surprising.
- The change in the regulatory framework has led a growing number of institutions to dedicate themselves to protecting their intellectual production and seeking partnerships with companies.

University Patents: 2000 to 2012 (% of residents)



Best practices

- Unicamp's TTO files between 40 and 80 new patents per year. More than 1,349 active companies were created by former students or derived from research conducted at the University.



Best practices

- Over the course of 25 years, CIETEC, a USP-IPEN incubator, has supported more than 1,000 startups.



FAPESP's Engineering Research Center (ERC)

- FAPESP's Engineering Research Center (ERC) Program uses the successful model of the long-term academics grants to finance research in partnerships with industry.
- The most important feature of an ERC's action plan is the multiplicity of its missions. The primary mission that grounds its activities is to execute complex research projects at the knowledge frontier, oriented by real problems and in pursuit of well-defined results that help form a world-class research center.
- In addition, the ERC's internationally competitive core research team must develop effective means to transfer technology, promote education, and disseminate knowledge.

FAPESP's Engineering Research Center (ERC)

- ERC must demonstrate:
- World-class research at the knowledge frontier, either basic or application-oriented, actively exploring opportunities to contribute to problem solving and to produce well-defined results with demonstrable potential to create social impact and technological innovation;
- Knowledge transfer to the partner firm and society including the business sector, the non-governmental sector and/or the public sector.
- Interaction with the education system, especially primary and high schools, for example, via FAPESP's Public Education Improvement Program

FAPESP: 31 and ... Engineering Research Centers

ERC New Target Discovery



ERC in Immuno-Oncology



ERC in Energy Production



ERC for Gas Innovation



ERC for Biological Control



ERC for Plant Molecular Breeding



ERC for Offshore Technology Innovation



ERC for Sustainable Chemistry



ERC in AI



ERC in New Energy



ERC in Plant Health in Sugarcane



Applied Research on Early Childhood



ERC in Plasticulture



ERC for The Aerial Mobility of The Future



Smart Networks and Services for 2030



ERC Prof. Urbano Stumpf



Technological Capabilities

- Universities can play important roles in creating technological capabilities... this depends on their conduct and the “absorptive capacity” of the business sector (the ability to recognize information, assimilate it and apply it for commercial purposes).
- Universities should not be ‘Ivory Towers’. Not because they will be held accountable by stakeholders, but because isolation will lead to missed opportunities to better fulfill their intrinsic missions (training people and positioning them in the market and conducting high-quality, high-impact research).

Final Remarks: The Innovation Agenda

- Many opportunities to Germany-Brazilian cooperation:
 - Germany enterprises in Brazil
 - Fraunhofer Projects and branches in Brazil
 - Verein Deutsch-Brasilianischer Ingenieure (VDI-Brasilien)
 - German Chamber of Industry and Commerce (AHK)
- Joint research projects
- Startups
- Strategic issues: energy transition, sustainability, quantum, AI, etc.