University-Industry Research Cooperation in São Paulo, Brazil

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Courtesy of Prof. Carlos Henrique de Brito Cruz, Scientific Director - FAPESP

Why talk about a state in Brazil

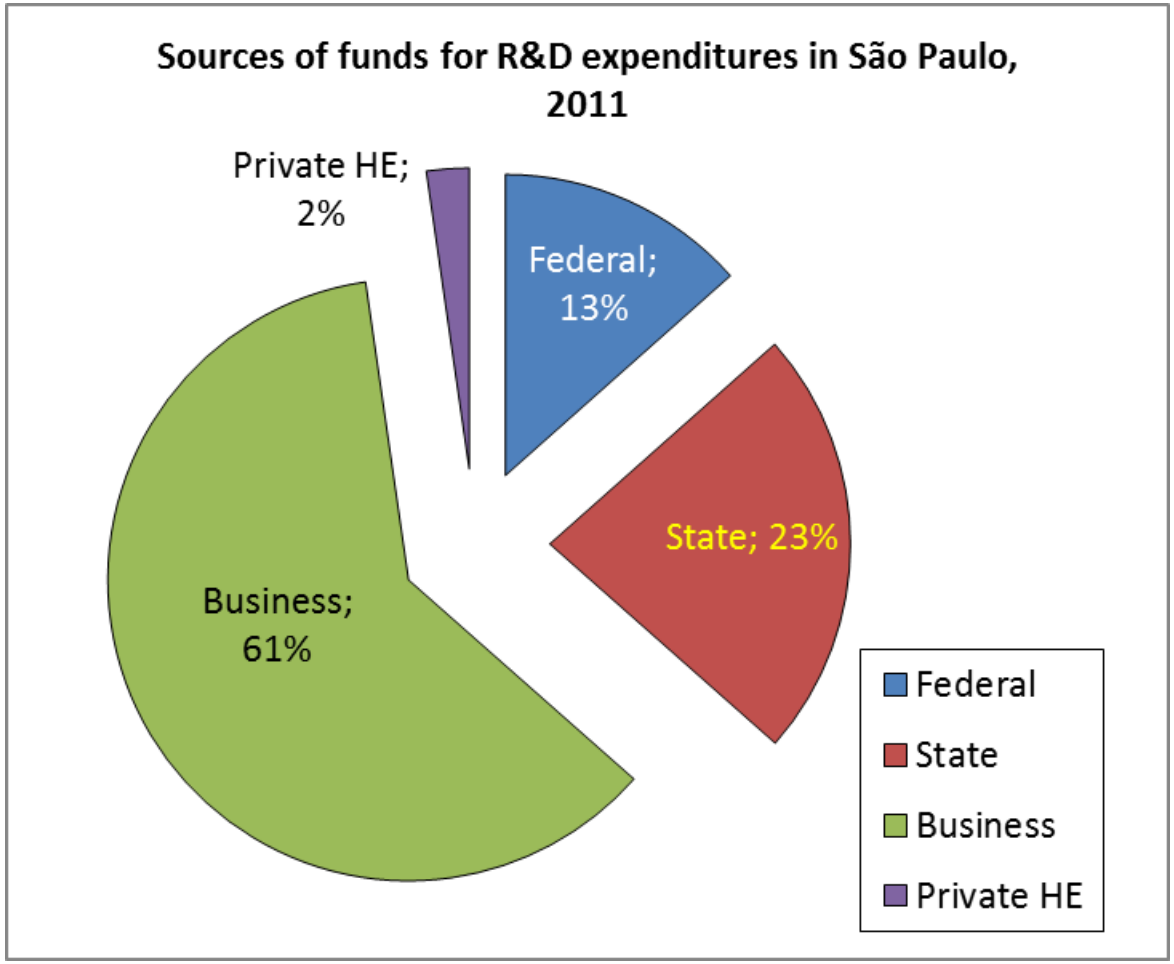
- Brazil is heterogeneous
  - Averages do not apply to any part of the country
- The State of São Paulo
  - 41 million people – similar to Argentina or Spain
  - Contributes 34% of Brazil's GDP
    - An economy larger than Argentina, smaller than Spain
  - Contributes ~50% of Brazilian Science
  - Graduates 45% of the PhDs in Brazil
- Intense university-industry cooperation

State of São Paulo, Brasil

41	Million people
34%	of Brazil's GDP
50%	of Brazilian science
13%	of State budget to HE and R&D
1.64%	GDP for R&D

3	State Universities
3	Federal Universities
52	State Tech Faculties
45%	of the PhDs graduated in Brazil (4,937 in 2010)
22	Research Institutes (19 state/3 federal)
1	Research Foundation
62%	of R&D public support comes from State sources

São Paulo: R&D Expenditures, 2011, by source



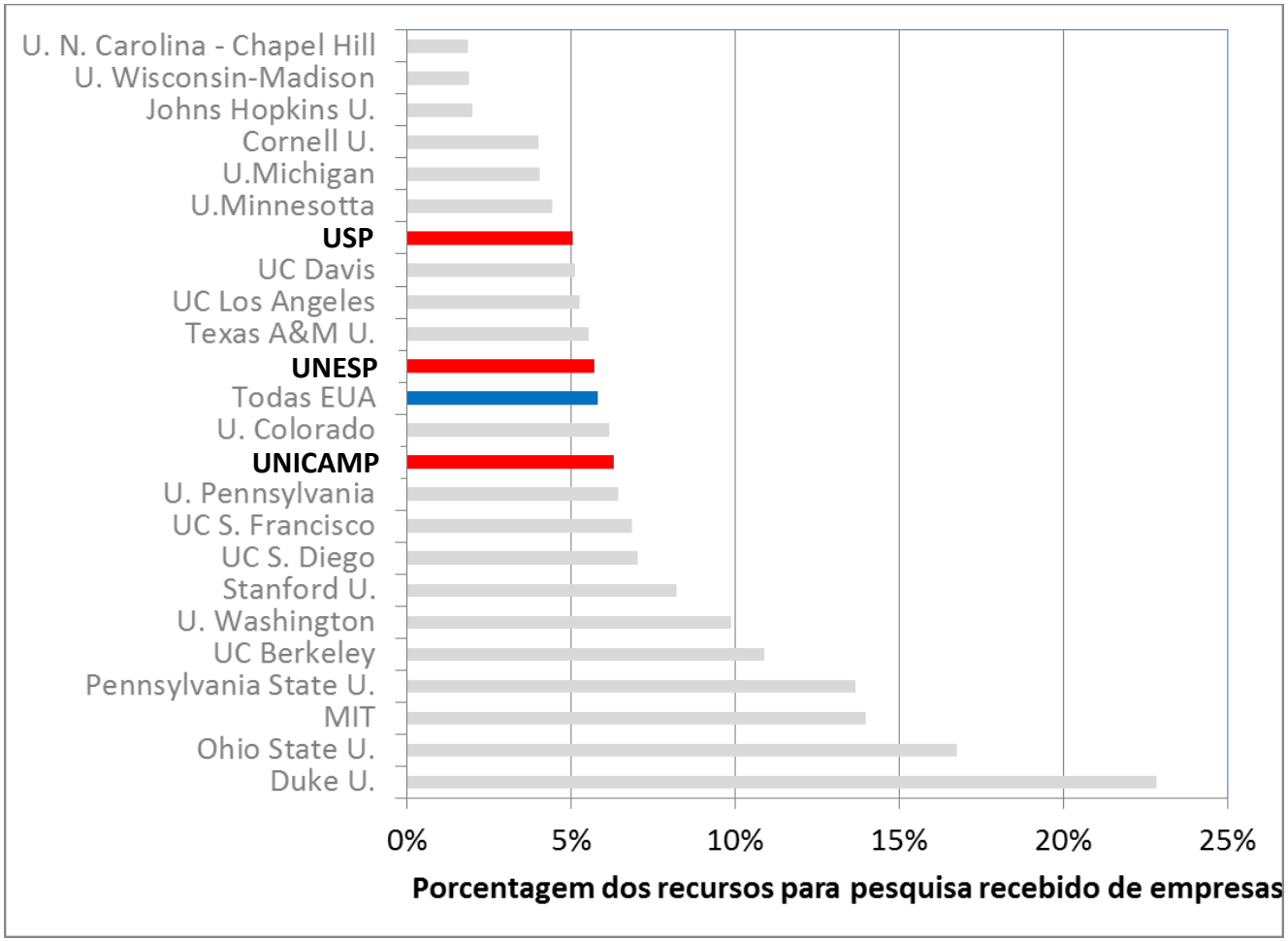
- R&D expenditures total 1.6% of state GDP
  - Grew from 1.52% in 2008
- Public expenditures
  - State 63%
  - Federal 37%

Three differential characteristics of the R&D expenditures in São Paulo

(2011 Values)	São Paulo	Brazil without SP
Intensity of the total R&D expenditures (TERD)	1.6%	0.9%
Business share of TERD	61%	25%
State share/ Federal share	171%	24%

Source: Indicadores FAPESP C&T&I

% of R&D budget from business sources: USP, UNESP, Unicamp and USA



Fapesp: São Paulo Research Foundation

- Mission: support research in all fields
- Funded by the State of São Paulo with 1% of all state revenues
- All proposals are peer reviewed (21,400 proposals in 2012)
  - Average time for decision– 65 days
- Annual budget: $PPP 600 M in 2012
  - **Fellowships** (3,000 SI, 2,600 MSc, 4,000 DrSc, 1,800 Post-docs, 800 other)
  - **Academic R&D** (RIDC, Thematic, Young Investigators, Regular)
  - **University-Industry Joint R&D**: Microsoft, Agilent, Braskem, Oxiteno, SABESP, VALE, Natura, Petrobrás, Embraer, Padtec, Biolab, Cristalia, Whirlpool, Boeing , GSK, BP, BG, PSA (Peugeot-Citröen), **...**
  - **Small bussiness R&D:** 1,200 SBE's (two PIPE+PAPPE awards per week in 2013)

Research cooperation: FAPESP-Industry agreements

- FAPESP and a company associate to call for proposals
  - Themes are proposed by the company
  - Exploratory Research (compatible to the academy)
  - Joint steering committee
  - Merit analysis by FAPESP (with referees indicated by the company and by FAPESP)
- Embraer, Natura, Ouro Fino, Oxiteno, Microsoft Research, Telefonica, Dedini, PadTec, Ci&T, Braskem, Whirlpool, Sabesp, Boeing, GSK, Vale, BP Biocombustíveis, BG, Peugeot-Citroen, ...
  - GSK: 1 Engineering Research Center on Sustainable Chemistry; 10 years, R$ 32 millions + in-kind contribution by the host university
  - Peugeot-Citroen: Engineering Research Center; 10 years, R$ 16 milhões + in-kind contribution by the host university (est. R$ 16 million)
  - Natura: Research Center on well-being and human behavior; 10 years; R$ 20 millions + in-kind contribution by the host university

University-Industry research cooperation

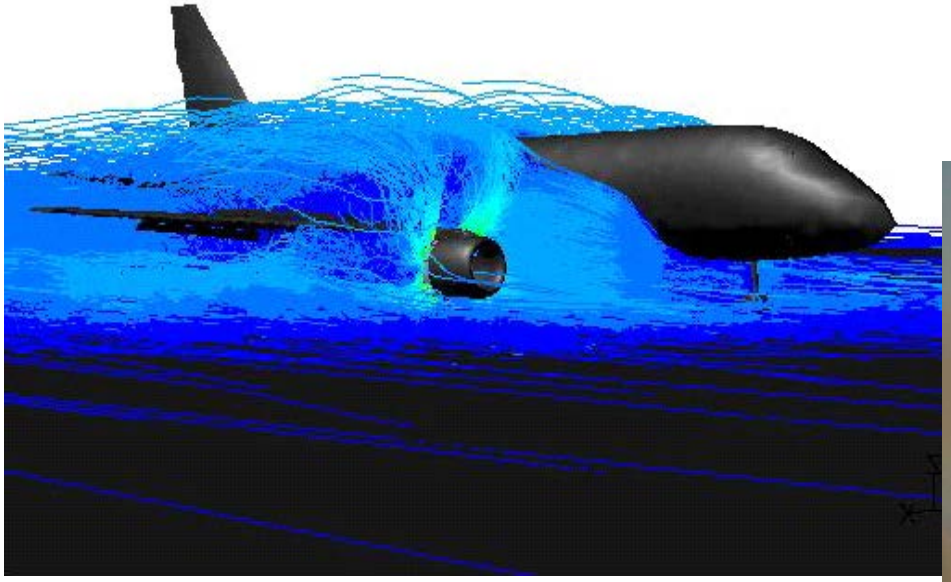
- Through the creation of start-ups
  - Universities in São Paulo generate many start-ups
    - ITA: Embraer, Avibrás, Orbisat,many others
    - Unicamp: more than 250 start-ups in the last 20 years
    - USP: too many to list
- Through joint research programs
  - FAPESP University-Industry Cooperative Program
    - 2 – 5 years grants, 50% from FAPESP, 50% from company
    - 10 years grants for competitively selected Engineering Research Centers:
      - Peugeot-Citroen: Ethanol powered automobile engines
      - GSK: Sustainable Chemistry
      - Natura: Psychology of Well Being
      - British Gas: Oil and Gas Technology and Logistics
      - GSK: Drug Discovey

University start-ups: 255 from Unicamp

UNICAMP ventures

Hangar360 · ALLAOI · eccaplan · Decisus · DPR Engenharia · Expertise Engenharia · Funcional Mikron · cyclades · Genkor Ingredientes · Agricef · AsGa · AQUARO · Imuny biotechnology · Josaphat · Thorus Sciosoft · edti · Flavor Food · alellyx · Green Technologies · B2Learn · BCS Tecnologia · BiomicroGen · ENGSYS · Tech Chrom · Rhea BioTech · Atria · GMReis · BIOWARE · br sa · Ci&T · electro pack · HVR · IgnisCom · INS Software · movile · ACQUA Software · UNIKA · daltonLabs · KAIZEN · ELETROVENTO · griaule · Hytron · idea! Sistemas Eletrônicos · SOFIST · vulcanet · CostaMarine · PRESTUS · UniCaronas · FIBERWORK Optical Communications · ips · Klais · Komlux · LABCOM Labcom Sistemas Ltda. · MobWise · zaine · CoffeeBean Technology · pluenca · Accenda · Arizono Arquitetura Corporativa · ICARO Technologies · MATERA Systems · sensedia · VERIDIS Tecnologia · dextra · OptoLink · ORAL HEALTH · phacton · RCA Soft · ujima software · Integrsec Data Mining · empreendemia · overplay · Tectoy digital · NEGER Telecom · Padtec · PRÓGONOS · Scylla · SOFT WAY · Unigen · aaTag · in metrics · Neolog · tuilux · ADTECH Telecom · ProFUSION embedded systems · reckon telecom building blocks · LOJA · SUN QUARTZ · VellyFARM · engene · ADTsys · i.SYSTEMS · OPUS Software · PRÓGONOS · GRUPO AISL · uni laser · UniSoma · VacuoFlex · taggen · odysci · GreenVision · Mitah · Star Corp · TOP Automação · Viaconsulting · vocalize · SDAMed · alibra · Bioluz · chuva inc. · cedet · CLCTEC · ImmunoCamp · Meta-Material · KIOSKIP · superlogica · TECH PLUS · ULTRABAN · brain WEB · Potere · linear · GENTROS · TermoCOP Engenharia · LUZ Engenharia Financeira · Thompson · VECO · DEC Brasil · FAPESP

Embraer-FAPESP: R&D to build an innovative jet



Computational Fluid Dynamics (CFD) simulation and tests
Research co-funded by FAPESP, using several universities

Microorganisms to biofuels

CSH PRESS GENOME RESEARCH

Genome structure of a *Saccharomyces cerevisiae* strain widely used in bioethanol production

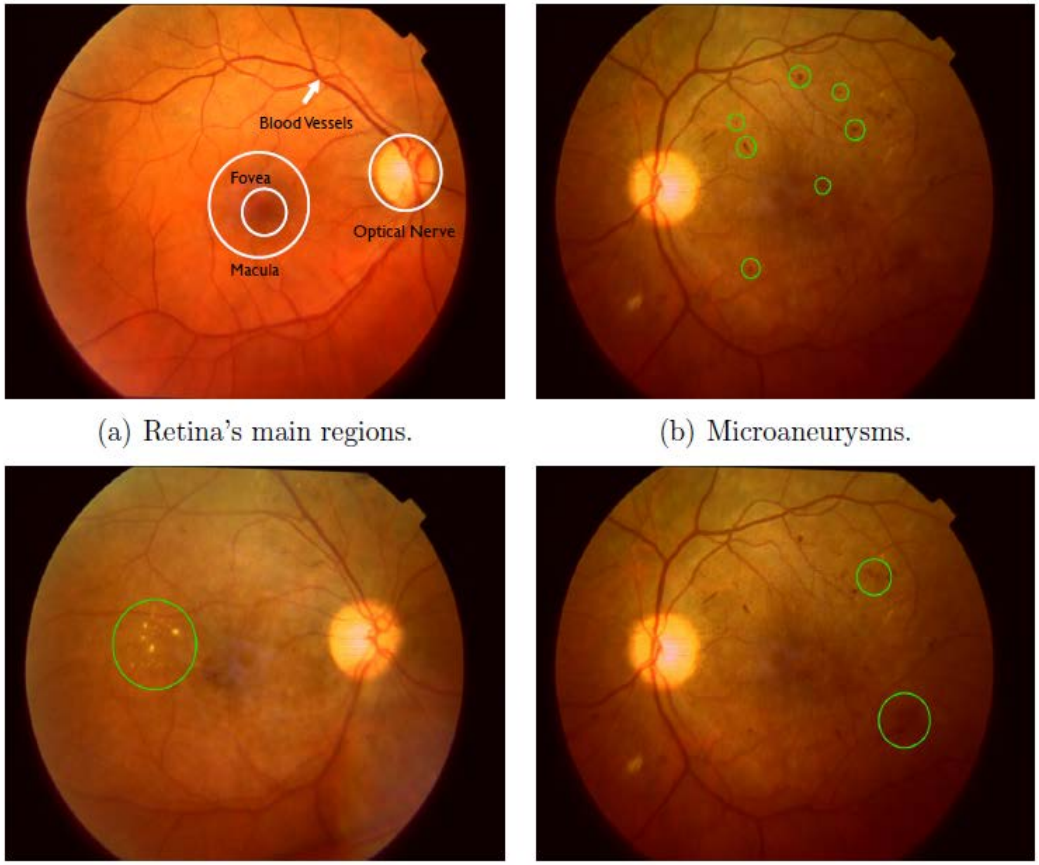
Juan Lucas Argueso,[1,9,10] Marcelo F. Carazzolle,[3,9] Piotr A. Mieczkowski,[6,9] Fabiana M. Duarte,[3] Osmar V.C. Netto,[3] Silvia K. Missawa,[3] Felipe Galzerani,[3] Gustavo G.L. Costa,[3] Ramon O. Vidal,[3] Melline F. Noronha,[3] Margaret Dominska,[1] Maria G.S. Andrietta,[4] Sílvio R. Andrietta,[4] Anderson F. Cunha,[5] Luiz H. Gomes,[7] Flavio C.A. Tavares,[7] André R. Alcarde,[8] Fred S. Dietrich,[1,2] John H. McCusker,[1] Thomas D. Petes,[1] and Gonçalo A.G. Pereira[3,10]

Pesquisa FAPESP – Cinco pesquisadores contratados por uma empresa. Essa foi a boa experiência vivida dentro do grupo do professor Gonçalo Guimarães Pereira, do Departamento de Genética, Evolução e Bioquímica do Instituto de Biologia da Universidade Estadual de Campinas (Unicamp).

FAPESP-Microsoft Virtual Research Institute

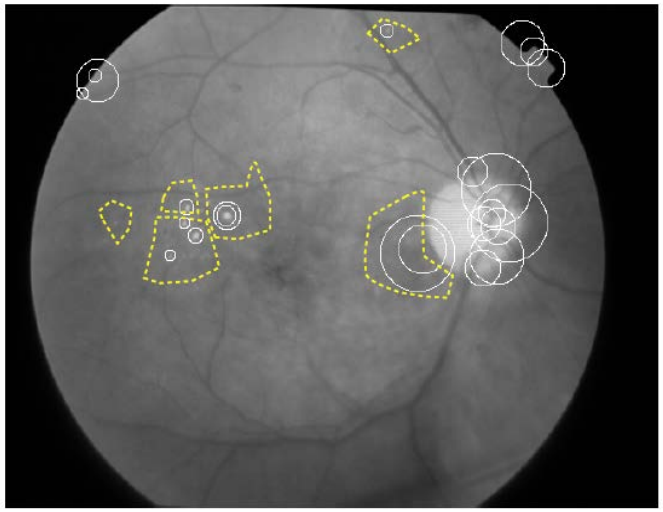
- Identification of Retinal Pathology
- Jacques Wainer and colleagues, Unicamp
- Diabetic retinopathy (DR)
  - Micro vascular retinal changes triggered by diabetes
- Machine Learning and Pattern Classification
  - Images of the human retina
    - Differences in pigmentation and presence of diverse lesions
  - Points-of-interest and visual dictionary
  - Works in different ethnic backgrounds
    - Application to Australian aboriginal population (33rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC '11)

Identification of Retinal Pathology



(a) Retina's main regions. (b) Microaneurysms.

(c) Intraretinal lipid exudates. (d) Hemorrhages.



Points of Interest marked by SURF (white circles), and by a medical specialist (yellow polygons)

(Source: A. Rocha, T. Carvalho, S. Goldenstein and J. Wainer, "Points of Interest and Visual Dictionaries for Automatic Retina Lesion Screening", submitted)

Obstacles: many, in many places (Phys. Today, 2008)

issues &events

Universities and industry find roadblocks to R&D partnering

Academic red tape, bickering over rights to inventions, and attractive terms abroad are limiting growth in industry-sponsored research at US universities.

Those who work at the intersection of the academic and industrial research enterprises have heard the story about the US manufacturer that, having spent countless hours trying to negotiate a co-operative research agreement with a university, gave up in a huff and took its business to an institution abroad. Trouble is, no one can, or will, identify the parties involved.

nology programs at Dow, says foreign universities ranging from Cambridge to Tsinghua will routinely assign their intellectual property rights over to the industry sponsor. Rather than haggling over IP, foreign institutions and their faculties are typically more interested in the experience they gain working on real-world problems, the industry con-

current president. The 85-member orga nization's initial project is the develop ment of a software tool called Turbo Negotiator, designed to identify bot common interests and differences in ex pectations the two parties have about research proposal that is being consid ered for funding. If a company is bring ing a lot of IP to the table, for exampl then it probably should b

National R&D expenditures, by funding sector: 1953–2006