



ICTs and University Rankings

Universidade de São Paulo Brazil

Summary

- General Introduction USP
- ICTs and Rankings our Vision
- CLOUD USP
- Conclusion and Next Steps

Brazil: 190 million people, 8th GNP



Brazil



© MACFELLOS, Hugo, Atlas do Mundo, RJ, 2007, 928-9285

São Paulo

- São Paulo State
 - ~70% of world orange production
 - 33% of Brazil GDP
- São Paulo City
 - 4th bigger city
 - 11.209.445 citizens



SP: target R&D expenditure for 2020

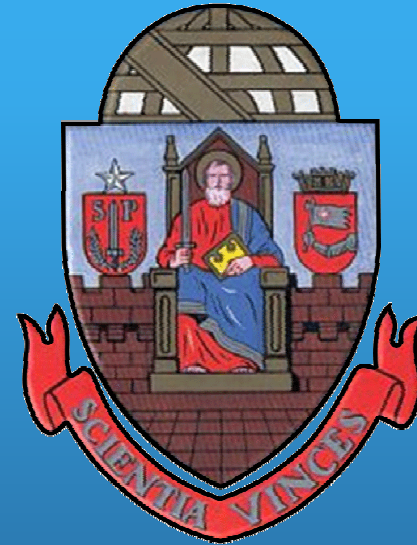
	2008	2020
R&D Expenditure (% State GDP)	1,52%	2,30%
Public R&D Expenditure (% State GDP)	0,56%	0,80%
Business R&D Expenditure (% State GDP)	0,96%	1,50%
SP GDP (Billion US\$ 2008; 4,5% a.a.)	566	960
Dispêndio em P&D em SP (bilhões R\$ 2008)	8,6	22,1

SP R&D Expenditures 2008 a 2020

200 billion US\$ from 2008

University of São Paulo

- Top R&D University in Brazil
- 100K Students:
 - 48K Undergraduate
 - 28K Graduate
 - 25k other courses
- ~ US\$ 2.5 B Fixed Budget
- US\$ 350M Variable R&D Budget
- 5K Profs. & Ph.D. Researchers
- 7 Campi
- 39 Faculties (129 courses)
- 33 Centers & 4/1. Institutes
- 4 Hospitals (8,000 Beds)
- 4 Museums



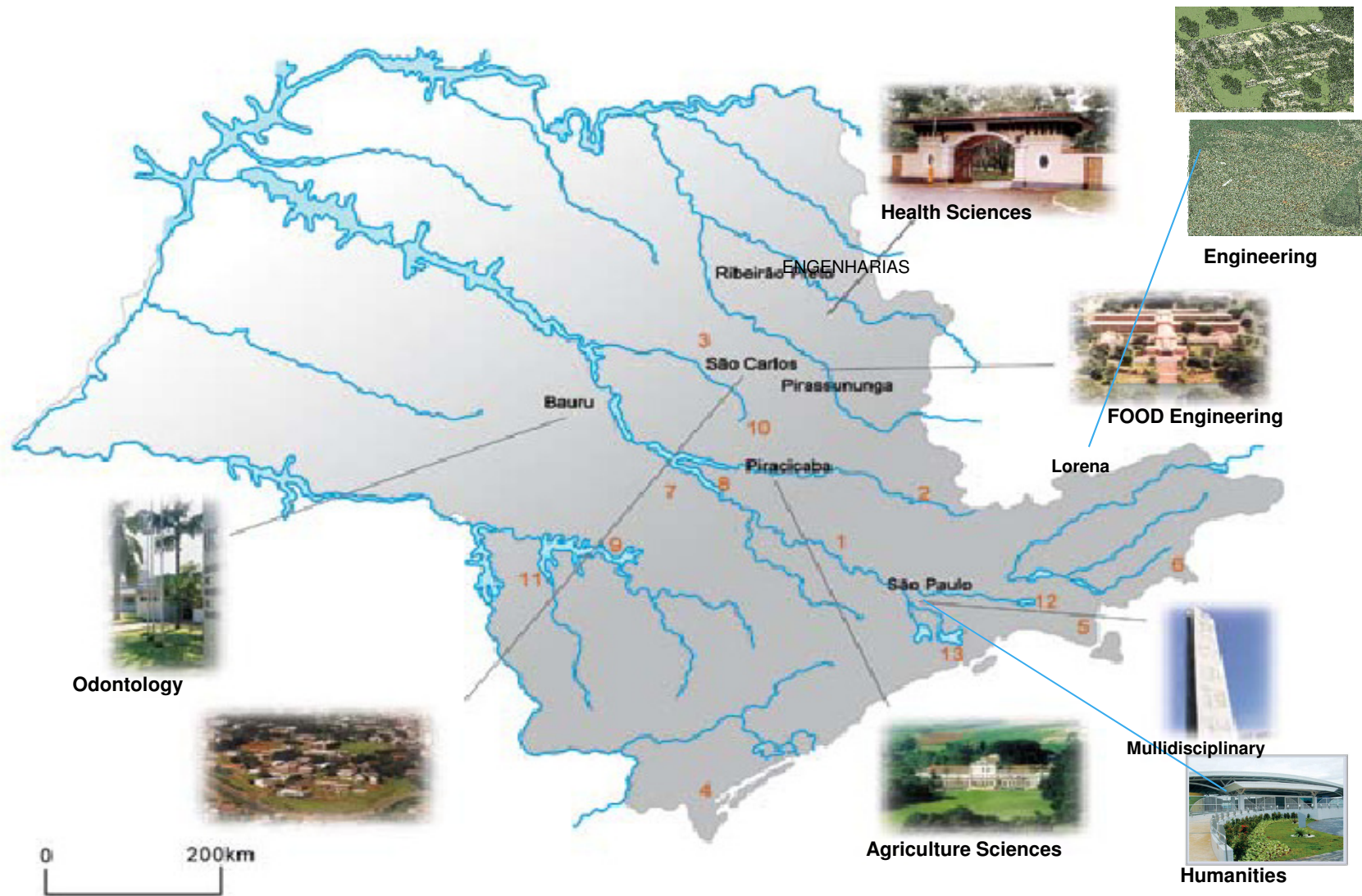


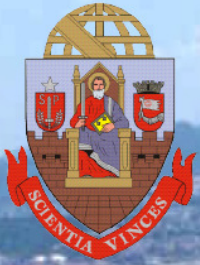
UNIVERSIDADE DE SÃO PAULO 75

Campi



USP and the São Paulo State



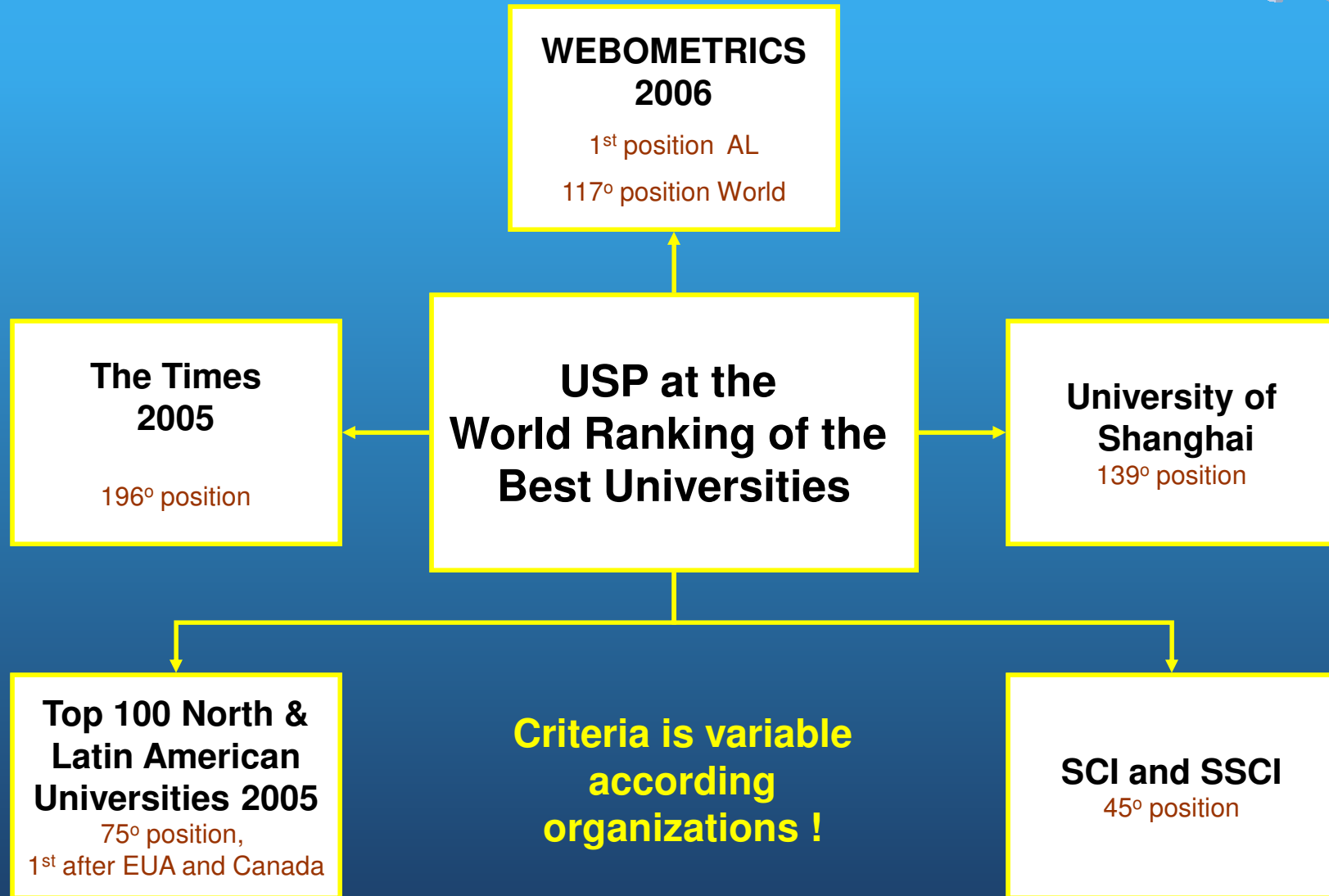


UNIVERSIDADE DE SÃO PAULO

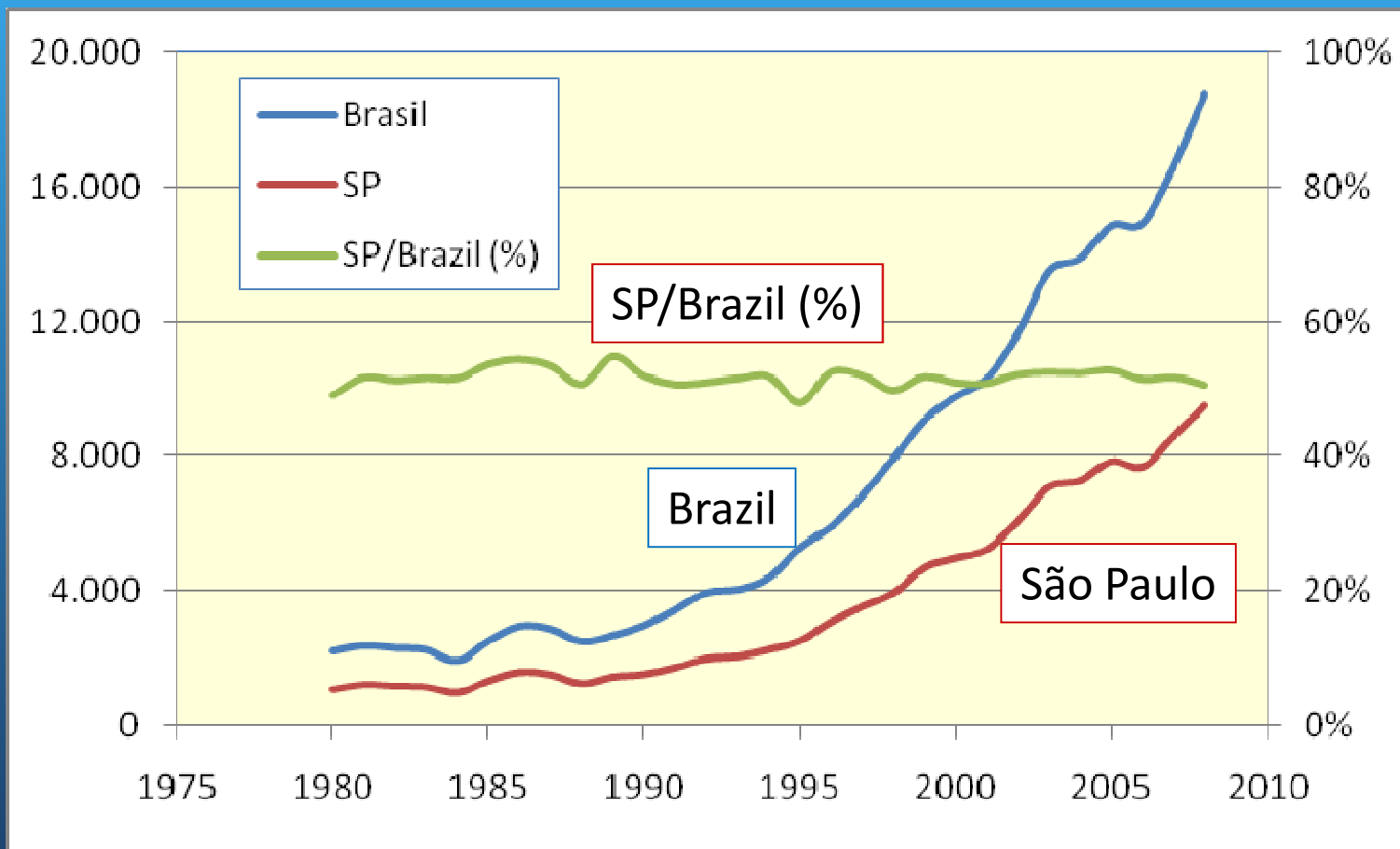
1934 | 2009
USP/50 ANOS

Campus São Paulo – 29 schools

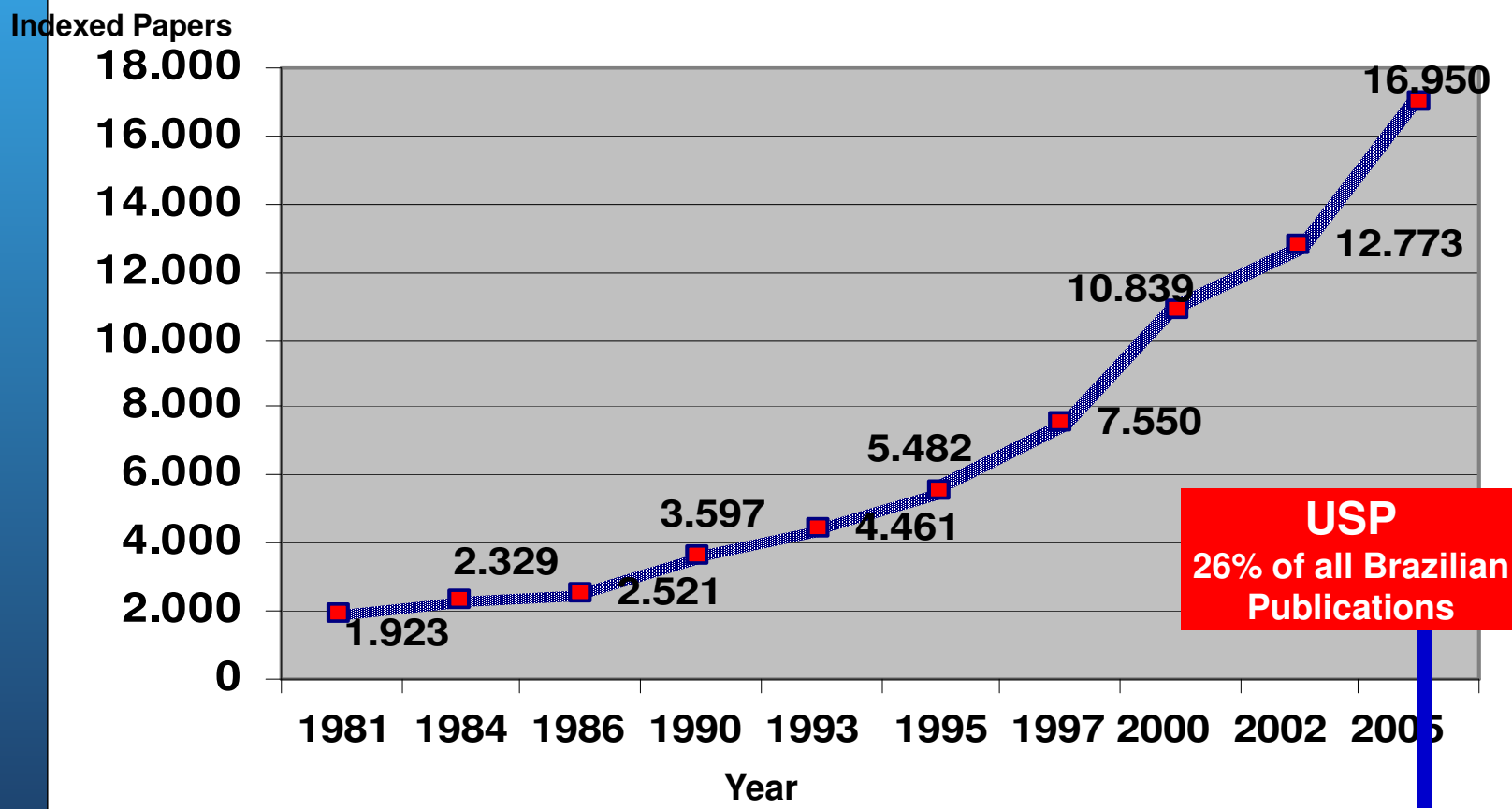
USP and World Ranking



Brazil: growing scientific production



Research - Scientific Production



Growth from 1989 to 2009

- USP growth 5%/year in the past 20 years
- Masters 244%
- PhDs. 275%
- Papers indexed by ISI 730%
- Number of professors 1%
- Staff - 15%

USP Challenges

- Internationalization
- Research excellence
- Academic excellence
- Institutional Planning and Management
- Diversity
- Solid interaction with society

Science Focus: Basic x Utilitarian

- In the World and in Brazil there is in an “utilitarian” view about Science
 - Science that makes business more competitive
 - Science that heals the sick
 - Science that makes the poor rich
- Utilitarian Science usually have more regional impact than world impact.
- FAPESP adds a not so “utilitarian” item
 - Science that makes mankind wiser
 - In all fields there are fundamental questions
 - Philosophy, Archeology, Literature, High Energy Physics, Cosmic Rays, Astronomy, Evolution,..

ICT and Ranking

- An Interesting problem to be solved
- Not Simple
- Everybody wants to to know how ICT impacts its business performance
- Few ones really know how to qualify its impact
- Education raise a particular focus for decades
 - UNESCO
 - World Economic Forum
 - Governments

The problem is well know

- After decades of investments in information technology, running into billions of dollars, governments are largely unable to convincingly demonstrate a return on investment that is widely understood or based upon well-grounded measures. Nevertheless, most agree that government has been dramatically changed by information technology (IT) and many programs and services are believed to be more effective and less expensive as a result.
- Quoted from the Center for Technology in Government
 - University of Albany
 - <http://www.ctg.albany.edu/projects/proi>

Rephrasing that !

- After decades of investments in information technology, running into **millions** of dollars, **universities** are largely unable to convincingly demonstrate a return on investment that is widely understood or based upon well-grounded measures. Nevertheless, most agree that **universities** has been dramatically changed by information technology (IT) and many **research programs** and **educational services** are believed to be more effective and less expensive as a result.
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How ICT ROIs Qualify Impact in Education and Research ?



- One Lap Top Per Child MIT Media Lab
- One Computer Per Student Brazilian Government

USP Investments in IT

- Around 750 staff members dedicated to IT
- US\$ 25M/year in corporate and learning
- Around US\$ 75-100M from research around 20% to 50% of research projects do investments in ICT (very hard to quantify)

USP Corporate Investments in IT

Target	Value(R\$)
Contracts Service providers in computing and communication services	4.710.000
Remote computing facilities	500.000
Network infrastructure	3.335.000
Telefony	2.000.000
Grid and cloud	2.500.000
Centers for electronic learning	800.000
Special projects (security, IPTV)	1.340.000
HPC and storage	2.000.000
SubTotal	17.185.000
Investments on the computing center	4.778.380
Investments on the corporate infrastrcuture	2.200.000
Upgrage og of computers	14.005.880
TOTAL	38.169.260

USP & the Cloud

The Cloud-USP

- 3 years project
- R\$ 63M investment (US\$ 40M)
- An opportunity to improve USP activities
 - E-science
 - E-learning
 - E-corporate

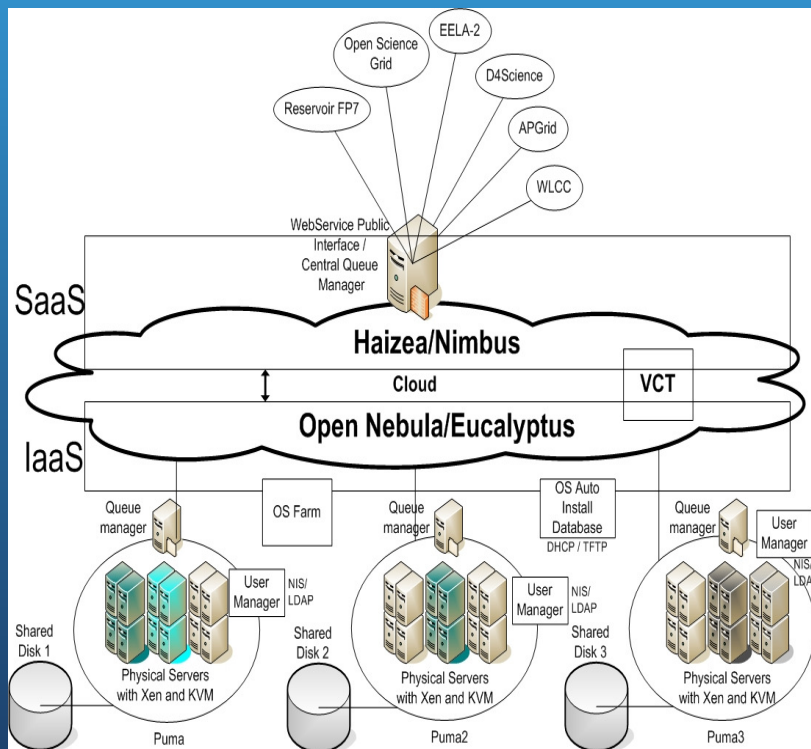
History



- **2003**
 - Use of networked storage services for SAN-FC-mail and backup
- **2004**
 - Hosting Services servers for the USP community in our data center: Housing, Web Hosting and "Housing"
- **2007**
 - First virtual machines hosting application
 - sCol (VirtualServer Microsoft)
 - Web hosting in a Linux environment (VMware)
 - Web hosting on Windows (VMware)
 - Generalization in the use of virtual machines to meet internal service
 - Adoption of virtual storage in existing Ethernet (iSCSI)
- **2008**
 - Generalization in the use of virtual machines to meet internal service
 - Adoption of virtual storage in existing Ethernet (iSCSI)
- **2009**
 - GridUSP: an approach to Grid Cloud (Xen OpenSource)
- **2010**
 - Consolidation of the electronic mail system (Xen -> VMware)
 - Janus (Xen -> VMware)
 - UNIVESP / Redefor (Citrix Xen)Multimedia
 - IPTV (Microsoft HyperV)
- **2011**
 - Incentives for Virtual Hosting
 - Restrictions on accommodation type Housing
 - 96 virtual machines (30 in the mail) in VMware and Citrix Xen 58 in (Redefor / UNIVESP)

GridUSP: A Scientific Cloud (2009)

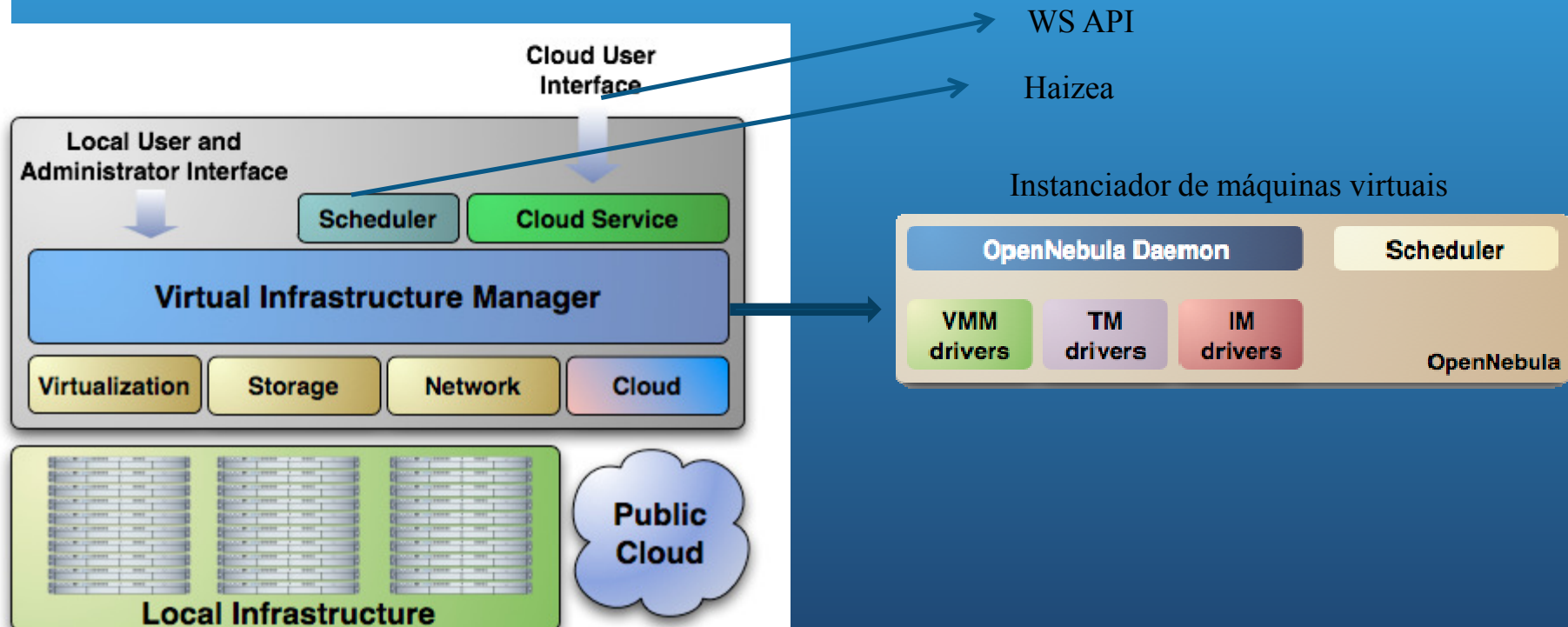
- <http://www.beliefproject.org/zero-in/zero-in-fourth-issue-emagazine/gridusp-as-a-central-facility-to-e-science-in-brazil>



Cluster Puma

- 11 nós físicos alocados em VM Fila Flex (VMs c/várias configurações)
 - 36 nós físicos (nó = 8 cores/16GB)
- Filas:
- Long : 15 dias running
 - Special: 7 dias running, não roda serial
 - Batch: só roda serial

A cloud testbed at USP OpenNebula (2009)



Cloud services

Applications Places System Thu Apr 22, 6:23 PM

ettore@dsu93: ~
 Universidade de São Paulo - iceweasel

File Edit View History Bookmarks Tools Help

http://dev.lcca.usp.br:3000/auth

Most Visited Getting Started Latest Headlines Ganglia: PUMA-Clus... Viva o Linux Agenda Eletrônica C...

Serralheria Vis... VIDA-ONE Inte... STICKY: The LC... LCD Panel Tec... how to migrate... IT Resource Ce... 5.3 Networking... Universida... Rails script/ser...

USP Universidade de São Paulo

CCE
 CENTRO DE COMPUTAÇÃO ELETRÔNICA

Nuvem USP ou CCE / USP Nebula

Hospedagem de Site

- Subdomínios
- Extensões PHP, Perl e Ruby
- Banco de Dados MySQL e/ou PostgreSQL com gerenciamento web
- Upload de arquivos via JFTP
- Gerenciador de Arquivos via Web
- Páginas de Erro personalizáveis
- Escalonador de Jobs (Cron)

DNS

- Serviço de DNS exclusivo
- Múltiplos domínios
- Servidor Primário e Secundário
- Gerenciamento via Web
- Registros tipo A, CNAME e MX

CMS (ref. Alfresco®, Sharepoint, Google Docs)

- Gerenciamento de documentos
- Gerenciamento de web
- Gerenciamento de Grupos Colaborativos
- Wiki, Blogs, Fóruns
- Repositório de Links, Imagens

Computação Científica

- Cluster Virtual
- Integride - Grid Middleware
- Virtual Data Toolkit
- Listar compiladores ?

E-mail

- Hospedagem de domínio MX.
- Gerenciamento via Web
- Cota personalizável por usuário
- Limite de vGB de espaço
- Acesso via IMAP, POP e Webmail

Groupware (ref. SoGO®, Google Calendar, Sharepoint)

- Compartilhamento de Calendários
- Gerenciador de Contatos
- Leitor de E-mail (IMAP)
- Compatibilidade com Microsoft Outlook, Apple iCal e extensões Thunderbird
- **Verificar possibilidade de unir serviço com E-mail.**

PABX Virtual (ref. Asterisk®)

- Ramais virtuais IP
- Protocolo SIP
- Grupos para conferência
- Integração com Skype (verificar)
- **Não terá integração com telefonia (por enquanto?)**
- Voicemail (verificar possibilidade de oferecer o serviço separado do PABX)

Terminal Service

- Servidor Windows 2008
- Até 15 clientes simultâneos
- Navegadores Internet Explorer, Chrome, Mozilla Firefox
- Suite Open Office
- Suite Microsoft Office
- Arquivos F-Secure
- Até 15 terminais thin clients
- Disponibilidade limitada

Autentique-se aqui para ter acesso aos serviços

Usuário:

Senha:

[Problemas no acesso?](#)

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Done Tor Disabled

ettore@dsu93: ~ [20100414_xen.txt (...)] Universidade de São... Hey, Scripting Guy! B...

E-science

- Storage Data Intensive
 - To provide significant more storage to all 6.000 researches at USP
 - social sciences, life sciences
 - how does it collect, manage and analyse the huge amount of digital content produced by researchers, and how does it keep that information for generations to come?
- HPC - CPU Intensive
 - Climate and geo-physical
 - Pre-salt
 - High Energy particles
 - Bio-informatics

E-learning

- USP Digital Libraries
- USP Digital Library
 - 14th in World, 27.000 Thesis and Dissertations
- To improve the digital learning ecosystems at USP
 - Wiki, moodle, USP social network STOA
 - IPTV USP

E corporate

- E-diploma
 - 5.000 undergraduate diplomas issued year
- E-registration
 - 100.000 registrations in one week (good example for elasticity!)
- Digital Certification
- Electronic Documents Management
- Email
 - More than 200.000 accounts.

Costs are being dramatically reduced

- Cycle Computing Creates a 10,000 Core Cluster in the Cloud
Massive cluster management delivers a top 114th supercomputer NEW YORK, April 5 -- Cycle Computing recently provisioned a 10,000-core, top 114-equivalent supercomputer utilizing its CycleCloud service. Since 2005, Cycle has helped clients maximize the world's compute resources through its reliable, secure and elastic high performance computing (HPC) solutions, both internally and in the cloud. CycleCloud massively scaled up client resources to perform hundreds of thousands of computational tests in a matter of eight hours. Once the results were produced, the customer could just "turn off" those resources with no further charges. Additionally, the 10,000-core cluster was run on a cost of only \$1,060/hour.
- Source HPC Wire
- <http://www.hpcwire.com/offthewire/Cycle-Computing-Creates-a-10000-Core-Cluster-in-the-Cloud-119256689.html>

Cloud USP

- A strong focus on virtualization and mobility from the technical point of view.
- We would like to provide:
 - Robustness
 - Transparency
 - Convenience
 - Contingency
 - elasticity
 - Training
 - cost-effectiveness

Conclusion

- The Cloud USP is an opportunity to considerably organize our ICT Services and improve quality in science, learning and corporate services
- The business model need to consider ranking as one important criteria.

Thank you!

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