

CS and IT Research in Chile

Funding and International Collaboration

Leopoldo Bertossi

Universidad Catolica de Chile (PUC)

Sociedad Chilena de Ciencia de Computacion (SCCC)

bertossi@ing.puc.cl

Where it is done

Research on CS and IT is done almost exclusively at universities

Industry and academic centers interact, but weakly on research activities

- Support to scientific events
- Software and hardware donations
- Continuous education
- Consulting
- ...
- Participation of industry in work conducting to engineering degree theses and master theses, e.g. ORACLE CHILE

There are activities around high-level software development at Industry

- Development of software to be embedded in micro chips (MOTOROLA CHILE)
- From the 80's there has been a software export industry
- ...

How are we doing?

The number of active researchers, at the international level, is low in comparison with the people working at departments of computer science, computer engineering, etc.

Many more young researchers are needed

Difficult to attract young, talented people to academy

Problem of “critical mass” in most of the areas

Support to research on CS and IT is a matter of the government, not to be left to individual initiatives

A national government policy is needed:

- Creation of a National Research Institute in CS is a must
 - distributed along the country
 - mostly virtual
 - with facilities for easy interaction among researchers
 - with funds for MSc and PhD scholarships, post docs, visiting professors, etc.

Country	Pure CS	Per capita	Applications	Per Capita
Argentina	63	1.8	298	8.4
Brazil	401	2.5	570	3.6
Chile	108	7.4	125	8.6
Mexico	74	0.8	272	2.8
Venezuela	49	2.2	95	4.2

Tabla 1: LA publications 1990 - 1998. Source: ISI

On the positive side

High level research in CS and IT is carried out in the country

We are in an important position in LA

Research collaboration with important centers in the world

Two PhD programs in CS and another one in Mathematical Modeling

- They are attracting many students from other countries in LA: Argentina, Bolivia, Colombia, Costa Rica, Cuba, Ecuador, Guatemala, Nicaragua, Panamá, Paraguay, Perú, Uruguay and Venezuela

A Chilean Computer Science Society (SCCC) that organizes and supports several research activities and keeps the CS community together, and participating in a collaborative and friendly atmosphere (from 1984)

Main event: Annual Meeting, including the SCCC International Conference

- Proceedings published by IEEE Press
- To be sponsored and co-organized by the IEEE CS (from 2001)

Web site: <http://www.sccc.cl>

Funds for CS research

Mostly coming from CONICYT: National Agency

- Research policies
- Research funding

Main funding programs:

- FONDECYT:
 - “equivalent” (in spirit) to standard NSF grants
 - the most obvious program to apply for CS researchers
 - quite competitive
 - supports: students, technical support staff, books, journals, equipment, mobility of local researchers, etc.
 - Up to US\$ 80.000 per year for 1-4 years

If a FONDECYT grant has been obtained, it is possible to apply to the “Support of International Cooperation Program”

Researcher from abroad can be invited to Chile to collaborate with the research project

- FONDEF
 - Participation of industry is mandatory (technology transfer)
 - Bigger amounts of money
 - Pre-competitive service or product oriented
 - Applied research is welcome and possible
 - Participation of foreign researchers is supported
- **International cooperation program**

International Cooperation Program

- Binational agreements
- a foreign and a Chilean coordinator
- Co-financed by foreign agency and partially by CONICYT
- Only for mobility of researchers: established researchers and students (in this case very limited coverage by CONICYT)
- (PhD scholarships)
- 1-4 years long projects
- Very competitive, very limited availability of funds at the Chilean level
- Has helped much to push forward interaction on research with the rest of the world

Some binational agreements:

- **NSF/CONICYT:**
 - 1 - 2 years
 - essentially one trip per year from each side to the other
 - has to be submitted on each side
 - on the US side: complex process to apply, essentially the same form as for a regular NSF proposal,
 - but more flexibility on expenses than on the Chilean side ...

Other binational programs

- ECOS/CONICYT (with France)
- CNRS/CONICYT (French National Center for Scientific Research)
- DAAD/CONICYT (German Agency for Academic Exchange)
- BMBF/CONICYT (Federal German Ministry for Education and Research)
- DFG/CONICYT (German Research Association)
- CNR/CONICYT (Italian National Research Council)
- BC/CONICYT (British Council)
- ICCTI/CONICYT (Portugal)
- CONICYT/“LA”: CNPq (Brasil), CONICIT (Venezuela), CONACYT (Mexico), CONICET (Argentina), ...
- CONICYT/JAPAN, CONICYT/KOREA

Some projects

- 1994–95 NSF-CONICYT “Desarrollo de Heurísticas para Problemas de Optimización”. Miguel Nussbaum (PUC) and Michael Pinedo (Columbia University, NY, USA).
- 1999–2000 NSF-CONICYT “Handling Inconsistencies in Databases”. Leopoldo Bertossi (PUC) and Jan Chomicki (Monmouth University, New Jersey).
- 1999–2000 DFG-CONICYT “Inspección Visual de Superficies Texturadas utilizando Técnicas de Procesamiento de Imágenes”. Javier Ruiz del Solar (Univ. de Chile) and Mario Koeppen (Fraunhofer Institut IPK, Berlin).
- 2000–2001 BMBF-CONICYT “Processing of Color Textural Image Information”. Javier Ruiz del Solar (Univ. de Chile), Nickolay Bertram (Univ. Kaiserslautern), Aureli Soria-Frisch, Mario Koeppen and Christoph Nowack (Fraunhofer Institut IPK, Berlin).
- 2000–2001 BMBF-CONICYT “Environmental Information Systems for Simulation, Prediction and Visualization of Air Pollution”. Achim Sydow (GMD - FIRST, Berlin) and Leopoldo Bertossi (PUC).
- 2000–2001 BMBF-CONICYT “Definition of a Conceptual Data Model with Flexible Integrity Constraints Management Capabilities”. Bernhard Thalheim (Technische Universität Cottbus) and Marcela Varas (Univ. de Concepción).
- 1994–1997 ECOS-CONICYT “Calcul Parallèle, Réseaux de Neurones et Automates Cellulaires”. Michel Cosnard (Ecole Normale Supérieure de Lyon) and Eric Goles (Univ. de Chile).
- 1994–1997 ECOS-CONICYT “Mathématiques de Images”. Alain Le Mehaute (Ecole Normale Supérieure des Télécommunications de Brest) and Florencio Utreras (Univ. de Chile).

- 1997-2000 ECOS-CONICYT “Complejidad y Dinámica de Procesos de Interacción Local”. Michel Morvan (Univ. Paris VII) and Eric Goles (Univ. de Chile).
- 1998-2000 ECOS-CONICYT “Action Logic for Planning, Database Updates and Temporal reasoning”. Camila Schwind (LIM-CNRS) and Leopoldo Bertossi (PUC).
- 2000-2002 ECOS-CONICYT “Estimación, Control y Supervisión de Procesos Biotecnológicos Agroalimentarios”. Paul Molin (ENSBANA) and Gonzalo Acuña (USACH).
- 2000-2002 ECOS-CONICYT “Búsqueda de Patrones y Aplicaciones”. Maxime Crochemore (Univ. Marne la Vallée) and Ricardo Baeza-Yates (Univ. de Chile).
- 1999-2000 STINT Foundation Sweden “Languages for Modeling Action and Change”. Patrick Doherty (U. Linkoping) and Javier Pinto (PUC).

Other agreements, funds, opportunities, ...

- CYTED (Spain, Portugal, Latin America) 21 countries
- Agreement “Centro Modelamiento Matematico” (Univ. de Chile) / CNRS (France)
- DAAD (Germany), Humboldt Stiftung
- Chilean/German Agreement on Technological Research:
 - IT, one among five areas of science/technology
 - A First Kickoff Chilean/German Workshop on IT was held in Santiago in September 1999 The second one will be held in Berlin in January 2001.
- STINT Foundation (Sweden)
- Specific programs of universities, e.g.
 - PUC: foreign professors/researchers can be invited to take part in PhD committees
- “Fundación Andes”: Visiting professors program (on each side)
Offices in Argentina, Brazil, Chile
- ACM SIGMOD’s Committee just created to foster DB research in LA
- ...

Research network in Chile

Main research centers are located in Santiago

They collaborate/support research with regional centers

In general, there is collaboration between groups working on the same subject along the country

Most of this collaboration is made possible and encouraged by the Chilean Computer Science Society

In particular, through the “Jornadas de la Sociedad Chilena de Ciencia de Computacion (SCCC)”: Intentional Conference, Chilean Meeting, Workshops (Distributed Systems, Computers in Education, Teaching of Computing, ...)

Main areas of research in Chile are:

- Database and Information Systems: Universidad Católica de Chile (Santiago), Universidad de Concepción (Concepción), Universidad Católica del Maule (Talca), Universidad Católica del Norte (Antofagasta), Universidad de Tarapacá (Arica)
- Information Retrieval: Universidad de Chile (Santiago),
- Theory of Computing, Algorithms and Cryptography: Universidad de Chile (Santiago), Universidad de Tarapacá (Arica), Universidad Católica del Norte (Antofagasta), Universidad de Magallanes (Punta Arenas)

- Software Engineering: Universidad Católica de Chile (Santiago), Universidad Técnica F. Santa María (Viña del Mar), Universidad de Chile (Santiago)
- Distributed Systems: Universidad de Chile (Santiago), Universidad Católica de Chile (Santiago), Universidad Técnica F. Santa María (Viña del Mar), Universidad de Santiago (Santiago)
- Computer Graphics: Universidad de Chile (Santiago)
- Collaborative Systems: Universidad Católica de Chile (Santiago), Universidad de Chile (Santiago), Universidad de Santiago (Santiago)
- Artificial Intelligence: Universidad Católica de Chile (Santiago), Universidad de Concepción, Universidad de Chile (Santiago), Universidad Técnica F. Santa María (Viña del Mar), Universidad de Santiago (Santiago)
- Programming Languages: Universidad Católica de Chile (Santiago), Universidad de Chile (Santiago), Universidad Técnica F. Santa María (Viña del Mar)
- Computers in Education: Universidad Católica de Chile (Santiago), Universidad de Chile (Santiago), Universidad de la Frontera (Temuco)

A new scenario

In Chile, around 0.6–0.7% of the GDP is invested in Science and Technology research

(small in comparison to developed countries in which this number rises to about 2–3%)

The newly elected President, Mr. Ricardo Lagos, promised, addressing nation before plenary congress on May 21st 2000

“to double the resources on this matter to reach an investment of over 1% of the GDP in the area by the end of his six years Presidential period”

“the first task the present government has set preference on is, to incorporate Chile into the technological revolution that is happening in the world”

“Chile must assume a leading role between the countries which use ICTs, specially Internet, as the engine for progress. A progress which shall be based on the flexibility of enterprises and not their size, on the intelligence of our people and not their geographical closeness, on cooperation and not on rivalry”

In his speech, the President insisted on the need to catch the wave of the technological revolution we are living

Some concrete actions (next months):

- A law regulating digital signature is soon to be dispatched to the congress for debate (before July 2000). This should not be a new law, but indications to modify the current legislation
- In the next three months the government will launch network of public workstations, usable by all people in the country
- CORFO¹ and the state owned bank (Banco del Estado de Chile) will give credit to 100,000 emerging enterprises, so they can acquire up to date computing equipment and receive proper instruction on its use and that of Internet
- The President also called to incorporate our workers, scientists, universities, etc., into the productive sector to achieve innovation and progress
- He proposed, together with the government of Argentina, to create a binational house in Silicon Valley, where to send our best talents from business and creativity.

¹Corporación de Fomento. Depends on the Economic Affairs Department. Support productive sectors (industry).

The government, through its Economic Affairs Department, is decided to promote business related to e-commerce, adoption of new technologies and Internet which should greatly impact the software industry

This involves 6 specific projects:

1. E-commerce. A law to regulate electronic documents and digital signature should be sent for debate to congress during June 2000

2. In the next three months the government will launch network of public workstations all around the country

The first one is due in Valparaiso June 22, 2000

3. From December 2000, an on-line information system for enterprises will be available

4. The government will promote useful web content for all population sectors

This program is supported by the Interamerican Development Bank (BID) 2001–2005

5. The market development division of the Economic Affairs Department is working together with the telecommunications agency to promote competence and market transparency

6. The foreign commerce department represents Chile in international negotiations regarding E-commerce

Presented before the press by the Subsecretary of the Department of Economic Affairs Alvaro Díaz, June 2, 2000

The “Information Society” has been taken as an important matter by the new government and its agencies

In particular, CONICYT is creating a new, internal and permanent “Committee on Information Society”

- about 10 members from government, academia and industry
- as part of the government’s generalized plan to modernize the state
- should promote initiatives to meet the challenges of the information society

The “Encuentro Chile Ciencia 2000: Un Encuentro Necesario” was held between 14 and 16 of June 2000

- organized by CONICYT and the Chilean Academy of Science
- with the presence of the President of the country and the Minister for Education
- about 1000 people from academia, industry, government met
- a National Plan for Science and Technology was handed out to the President
- shows the priority assigned to scientific and technological development of the country by the government and the scientific/technological community

Some conclusions ...

1. The government has just announced promising policies and guidelines that can make us be optimistic with respect to financing of research and adoption on/of IT

Scientific and technological development is a priority for the new government

2. With respect to ICT infrastructure, Chile is in a leading position in Latin America (LA)
3. The quality of research on IT in Chile is very high in comparison with the others countries in LA
4. Chilean graduate programs in IT are attracting many students from other countries in LA
5. There is a problem of critical mass in research groups and a lack of them in emergent IT methodologies

Attracting young and talented people to graduate studies, academia and research is the most difficult challenge

Creating funds for scholarships is a priority, including talented undergraduate students and foreign graduate students

6. The creation of a “National Research Institute on IT” is necessary

It can be implemented almost in a virtual modality, by taking advantage of ICTs

The Institute should play a leading role in attracting young people to research, via under graduate and graduate scholarships, post doctoral research, research projects with industry involving young researchers, etc.

7. Most of research is done at universities, with industry playing a minor role

It is crucial to involve industry in research

The interaction of academia and industry has to be promoted and supported

The government has to play a fundamental role by making attractive to industry to carry out and support research and hire young scientists to develop creative activities inside their organizations.

Scholarships should be created to help finance research internships at the industry by both students and faculty members