



REPORT

ICT research in Argentina

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1. INTRODUCTION: THE SITUATION OF R&D ON ICT IN ARGENTINA

Since the deep economic crisis Argentina has undergone in December 2001 and most of 2002, there has been a surprising economic recovery, mostly due to exportations of agricultural products, and tourism, even if the levels of poverty and indigence still remain exceedingly high (40% and 15%, correspondingly – see Marí, 2005¹). Knowledge industries, such as software, cinema, clothes and furniture design, have found new production and exportation niches. In the scientific domain, the expenditure in science and technology (S&T) has increased, in its relation to GDP. The initial National Budget for 2006 in S&T Activities (AC&T) was Argentine Pesos \$362, 7 million (approximately 120.9 million US Dollars) more than the initial credit for 2005, representing a growth of 28,6%². However, the level of AC&T in the Overall National Budget does not reach 2%. In year 2005 it was 1,64%, increasing to 1,74% in 2006. Argentina's National budget for AC&T is still significantly lower than other Latin American countries³, such as Brazil, Mexico, and Chile.

The country has not an Information Society Plan. Information Society issues have been initially undertaken by the National Secretariat of Communications⁴, but currently, it is the Secretariat for Science, Technology and Productive Innovation (Secretaría de Ciencia, Tecnología e Innovación Productiva - SeCyT) the player which takes initiatives for policies and strategies in this field. SECYT is the governmental institution responsible for the design and implementation of the national S&T policy, the coordination of the activities carried on in this sector, control and assessment of S&T administration, as well as the promotion and dissemination of these activities.

The SECYT has recently published two outstanding documents regarding R&D medium and long term planning: the Bicentennial Strategic Plan for Science, Technology, and Innovation⁵ 2006-2010 (PROTIS), and "Basis for a Mid-Term Strategic plan in Science, Technology and innovation"⁶.

PROTIS chooses among its priority areas "Industry Competitiveness and Modernization of Production Methods", including ICT: industrial informatics, automation, robotics, microelectronics, clean technologies, as well as ICT use in health, education, transportation infrastructure and services, bioinformatics, energy, and environmental issues.

¹ RTD in Argentina - By Manuel Marí, http://prest.mbs.ac.uk/prest/SCOPE/documents/National_Report_Argentina_eng.pdf

² SECYT, PRESUPUESTO INICIAL EN AC&T1 2006, EL PLAN ESTRATÉGICO Y LA LEY DE FINANCIAMIENTO EDUCATIVO, http://www.secyt.gov.ar/presupuesto_2006/documentos/informe_inicial_2006.pdf

³ See Comparative Table at http://www.secyt.gov.ar/indicadores_2004/banco_indicadores/documentos/HTM/C1.html
⁴ In the years 1990s

⁵ Plan estratégico nacional de Ciencia, Tecnología e Innovación "Bicentenario" (2006-2010)

⁶ "Bases para un Plan Estratégico de Mediano Plazo en CTI", http://www.secyt.gov.ar/bases_plan_estrategico_05_15/pdf/bases.pdf

The “Basis” analyzes possible scenarios for the country’s development. The Scenario for Sustainable Development is characterized, among other elements, by:

- “In *Economy*: A more a more selective opening to the international trade takes place, together with taking greater advantage of an educated and relatively educated workforce, which helps to obtain falsified product competitiveness and services, fortifying the producing sector of goods and services with a strong impulse to build its own technological capacity.
- In *Science & Technology*: long term policies oriented to the strenghtening of the scientific basis, R&D orientation, technological dissemination, and encouragement to innovation are established. They are directed, on one hand, to reach high added value in sectors capable to compete in exports markets, and on the other hand, to increase the efficiency in all productive activities, and attention to social needs”.

The production of synergies among different social actors oriented to build useful knowledge for development is one of Argentina’s great challenges. It is indispensable to strengthen the scientific and technological capacities in order “definitely overcome the recurrent social and economic crisis of the last decades, and to reinsert the country in the world economy”⁷ (SECyT: 9). The State policy Argentina is implementing towards these goals has considered as priority steps the production of knowledge and the management of technological changes.

Among the challenges stated by this national goal, there are two directly linked to the construction of synergies between S&T research and the productive sector:

- “c. To build an articulated National Innovation System, in order to favour the development of employment producing enterprises, and high technology enterprises.*
- d. To have access to a society and an economy based on knowledge, with high levels of education, scientific capacity and an innovative culture”* (SECyT: 11).

SECyT or SeTCIP has created the Observatory of Technological Prospective⁸ (**O**bservatorio de **P**rospectiva **T**ecnológica - **OPTE**) though an agreement with ONUDI (United Nations Organizations for Industrial Development). OPTE allows to capitalize other countries’ experiences in prospective though the regional program for Industrial prospective implemented by ONUDI.

Marí (2005), states: “There seems to be a new consensus in the country among politicians, entrepreneurs, and universities: to develop new technology-based areas, and to add value to production and to natural resources (tourism included). The scientific community, which, notwithstanding the recent crisis, still has high levels of productivity, accompanies this project. Finally, there is a spirit of entrepreneurship among young scientists and engineers, which enlightens a promising future”.

⁷ Bases para un Plan Estratégico de Mediano Plazo en Ciencia, Tecnología e Innovación. SECyT, Secretaría de Ciencia, Tecnología e Innovación Productiva, Ministerio de Educación

⁸ <http://www.opcyt.setcip.gov.ar/>

2. THE LEGAL FRAME

The country has different laws that organize the system of science, technology and innovation, among which it stands out Law 25,467 of Science, Technology and Innovation (September 2001). "This law intends to establish a frame "that structures, impels and promotes the activities of the area, in order to contribute to increase the cultural, educative, social and economic patrimony of the Nation, favouring common good, the strengthening of the national identity, the generation of works and environment sustainability⁹." The Law also establishes the objectives of the country's scientific and technological policy, the budgetary structure of the S&T system and the budgetary dispositions for funding R+D activities.

The main autarchic organisms of the public sector were created and organized by means of national government decrees or laws, beginning with the National Commission of Atomic Energy (CNEA) - 1950 decree 10936 - and the CONICET - 1951 decree 9695. Nuclear activity is legally regulated. The State determines the regulation policy, and criteria, and to exert the functions of R&D in this field. Other examples of legislation in the area are the regime of intellectual property, the legislation on invention patents and utility models, and the norm on biosafety.

3. MAIN ACTORS AND PROGRAMMES FUNDING ICT R&D

MAIN NATIONAL AND INTERNATIONAL PUBLIC INSTITUTIONS RELATED TO ICT RESEARCH

The main players that fund ICT research in Argentina are National State institutions, Federal Governments, International organizations, and business enterprises. State research institutions, Universities, and Community organizations (NGOs) carry on research related to ICTs, although there is not currently a specific Program to fund ICT research.

The major agents in the field of ICT research are:

1 National State Institutions:

1.1 National Government: MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY¹⁰

- SECyT: Secretariat of Science, Technology and Productive Innovation¹¹. SECyT deals in all matters related to the layout and implementation of the national S&T policy, the coordination of the activities that are carried out in this area, the assessment and control of the administration and the promotion and publication of these activities. The activities carried out

⁹ Red de Indicadores de Ciencia y tecnología, RICyR, <http://www.riicyt.edu.ar/interior/interior.asp?Nivel1=6&Nivel2=6&IDMiembro=1&Idioma=>

¹⁰ <http://www.me.gov.ar/>

¹¹ <http://www.secyt.gov.ar/>

can be classified as: S&T research and development, human resources, training in S&T, broadcast of science and technology, technological innovation, services and transference of S&T, among the main ones. SECyT supervises both the ANPCyT and CONICET activities

- ANPCyT: the National Agency for Scientific and Technological Promotion¹² is a governmental institution, dependent from the National Ministry of Education, and dedicated to promote activities related to Science, Technology, and Innovative Production. The Agency promotes the financing for research and development projects oriented to improve social, economic and cultural conditions in Argentina. Through its two Funds – Funds for Scientific and Technological Research (FONCyT, which administrates funds for S&T Research), and Argentine Technological Fund (FONTAR, which manages financial resources for R&D, technological developments, technological modernization, technological services for institutions and Small and Medium Enterprises (Smes), technical assistance, and enterprises' incubators, technological parks and technological poles, among others).
- CONICET: National Council on Scientific and Technical Research¹³: CONICET is the main organization oriented to S&T Research in Argentina. Among other activities, CONICET encourages and funds S&T research, it promotes S&T cooperation and exchanges within the country and with foreign research centres, and most important, it manages the Careers of Scientific Researcher and Support Staff for R&D. According to Marí (2005), CONICET and its “research career” (which has now more than 6,000 members) is the only institution of its kind in the world, together with the CNRS of France, that pays salaries to its members to develop research. CONICET also supports about 100 RTD centres, most of them in joint ventures with national universities. It also supports international cooperation research projects, jointly with international organizations, and international research programs.

Other National organizations dealing with ICTs:

- *Atomic Energy National Commission (CNEA)*. CNEA, created in 1950, depends on the Ministry of Federal Planning and public investment. It is the main organism of S&T activities in the nuclear field; research and development, selling of specialized services, and training of human resources.
- *Spatial Activities National Commission (CONAE)*. CONAE is a decentralized organization, created in 1991, and dependent from the Ministry of Foreign Affairs, International Commerce and Cults. CONAE is responsible for designing, executing, controlling, manage and administer spatial projects and initiatives. It develops the National Plan for Spatial S&T Position and Progress for Peace Purposes (Plan Nacional para la Ubicación y Aprovechamiento de la Ciencia y Tecnología Espacial con Fines Pacíficos), as well as its funding mechanism. It centralizes, organizes, manages and executes the National Spatial Plan.

¹² <http://www.agencia.secyt.gov.ar/agencia.php>

¹³ <http://www.conicet.gov.ar/INSTITUCIONAL/Descripcion/objetivos.php>

- Armed Forces' Science and Technology Research Institute (Instituto de Investigaciones Científicas y Tecnológicas de las Fuerzas Armadas - CITEFA). ITEFA is a centralized organization, dependent from the Defence Ministry, created in 1954, and oriented to R&D activities for the Army. It develops research on arms and army equipment, including communications, subsystems, technological developments, with the goal to satisfy civil and military needs through technology transfer.
- *National Institute of Agricultural Technology (Instituto Nacional de Tecnología Agropecuaria - INTA)*. INTA, created in 1956, is a decentralized, autarchic and autonomous organization, dependent from the Ministry of Economy and Production, oriented to farming, stockbreeding, and forest activities in Argentina. Its mission is to generate and apply knowledge and technologies from a demand-oriented vision, coming from agricultural sectors and from the prospective of scientific and technological progress in the World, and to disseminate it through transfer and extension processes. It has three national agriculture and stockbreeding research centres with 12 institutes; 12 regional centres, including 47 experimental stations and 240 agencies for technological transfer.
- *Industrial Technology Institute (Instituto Nacional de Tecnología Industrial - INTI)*. INTI, created in 1957, is a decentralized organization dependent on the Ministry of Economy and Production. Its mission is to promote the development and transfer of technology to the industrial sector, using already existing technologies or instrument innovative solutions, and to ensure that the quality of the manufactures goods and services compiles to World tendencies and norms, so that Argentine industry can reach a high level of international competence. Its research and services cover a broad productive spectrum (industrial materials and processes, energy and environment, quality, food, metrology, chemistry and petrochemistry, electronics and informatics, construction, and infrastructure). INTI has 31 R&D centres, plus 5 regional delegations.

2 Federal Governments

- *ACC: Cordoba Science Agency*¹⁴. The Agencia Científica de Córdoba (ACC) develops activities in areas concerning production, cooperation, and education in S&T. It funds graduate and postgraduate scholarships, recent research groups, and projects that conform a (PICTOR, PICTOR II, PROTRI). It also supports S&T events. ACC cooperates with EEUU, through the Fulbright Commission, implementing exchange programs with researchers from the Cordoba Province and EEUU. ACC works with the Cordoba Province Government in software design, development and production. Diverse Smes and local universities participate in this Program.
- *CIC: Province of Buenos Aires Scientific Research Commission*¹⁵. The CIC has an overall policy to manage knowledge production as well as its effective application to the Buenos Aires Province's social and economic development. Its main mission is to: a) Create, manage and transfer

¹⁴ <http://www.agenciacordobaciencia.cba.gov.ar/>

¹⁵ <http://www.cic.gba.gov.ar/Institucional/IndexInstitucional.htm>

knowledge; b) encourage the incorporation of knowledge to the production of goods and services. As the CONICET, the CIC manages the Careers of Scientific Researcher and Support Staff for R&D. ICT are not in its priority areas.

- *CFI: Federal Investment Council:* The Consejo Federal de Inversiones¹⁶ (CFI) is a permanent agency of research, coordination and counseling. It is in charge of recommending the necessary measures for a suitable investment policy, and a better use of the different economic ways leading to achieve a development based on decentralization. The Fondo Federal de Inversiones (FFI) is the financial instrument of Consejo Federal de Inversiones. Its purpose is to cooperate by means of funding with the public and private sectors in the cooperation of specific projects or programs at the preinvestment and investment levels. Within its credit lines the FFI has financed productive Micro-projects, and Small and Medium.sized Enterprises (SMEs), having granted since 1990 around 5000 loans exceeding a total of 150 million dollars. Currently, a line of [Credits for the Exportable Regional Production](#) is available. See also the new [Credits for Business Reactivation](#).

3 Universities

A third actor in the national scenario is the Academia, represented by the Universities, particularly the National University of Buenos Aires (UBA), the national University of Córdoba (UNC), the National University of Rosario (UNR), the National University of La Plata (UNPL), and the National University of Cuyo (UNCuyo), Mendoza.

According to the Argentine Ministry of Education, Science and Technology (2004), there are in the country 79 universities, of which 38 are public, and 41, private. There are also 18 university institutes (two-thirds of them are private), a foreign university, an international university and a Provincial university (Finkelievich and Prince, 2006¹⁷):

	State	Private	Total
Universities	38	41	79
University Institutes	6	12	18
Foreign University		1	1
International university		1	1
Provincial University	1		1
Total	45	55	100

Source: Ministry of Education, Science and Technology (2004), p.13, Table1.1.

“Unfortunately, the military regimes in 1966-73 and specially the terrible one in 1976-83, tried to reduce the role of the University to a minimum. This was the case with the University of Buenos Aires in 1966, and, 10 years later, with all universities. The newly elected democratic government in 1983 tried to set a new equilibrium, but with no much success. The only alternative left then for execution of scientific research was CONICET”, Mari, (2005).

¹⁶ http://www.cfired.org.ar/ingles/indices/f_1.htm

¹⁷ Susana Finkelievich & Alejandro Prince: “Universidades y TICs: Las Universidades argentinas en la Sociedad del Conocimiento”, Telefónica, Buenos Aires, 2006.

Most of the University researchers in Argentina depend on CONICET or university teaching for their living and on the ANPCYT and CONICET for the financing of their projects. In 1997, a new instrument was created to promote research in the public Universities by the Ministry of Education: the Salary Incentives for Research Program. It offers surplus money for professors who participate in RTD projects approved by their University (Marí, 2005). It has a budget of 70 million pesos (18.7 million Euros), around 20% of all the other University funds for S&T. This instrument was designed to improve the conditions of university budgets and of its researchers: Argentina has a very small percentage of professors working full time, so the Program of Incentives was oriented to satisfy an urgent need for research funds as well as salary complements. Unfortunately, the funds are too low to develop real research with them. On the other hand, there was a fast upsurge of “research teams” hastily built by underpaid university professors, eager to complement their salaries. The result was an unsatisfactory system.

4 International Organizations

- RICYT: Science and Technology Indicators Network¹⁸ – Latin American and Inter American. All American countries, together with Spain and Portugal, participate in this network. RICYT was created by the Ibero-American Program for Science and Technology (Programa Iberoamericano de Ciencia y Tecnología para el Desarrollo - CYTED) in Argentina in 1994. Its main goal is to promote the development of instrument to measure and analyze S&T in Ibero America, within a frame of international cooperation, in order to deepen its knowledge and use it as a political instrument for decision making.
- UNESCO: United Nations Educational, Scientific and Cultural Organization¹⁹. It has financed some research projects on ICTs related issues. Its cluster office is in Montevideo. (Cluster Office to Argentina, Brazil, Chile, Paraguay and Uruguay). Its mandate is to take responsibility for the activities of UNESCO in all its fields of competence, working closely with Headquarters, other Field Offices in the region (Santiago and Brasilia) and National Commissions. Its specialisation is science and its role in this respect is to promote, implement and coordinate UNESCO’s programmes, projects and actions at national, sub-regional and regional levels. Priority is also given to basic, secondary and higher education for all, including quality education and innovation for MERCOSUR.
- International Development Research Centre (not based in Argentina, but with various projects there). IDRC is a Canadian Crown corporation that works in close collaboration with researchers from the developing world in their search for the means to build healthier, more equitable, and more prosperous societies. Within IDRC, The Institute for Connectivity in the Americas (ICA) emerged from the 2001 Summit of the Americas. It is the forum for hemispheric innovation in the application of information and communication technologies (ICTs) to strengthen democracy, create

¹⁸ <http://www.ricyt.edu.ar/>

¹⁹ http://portal.unesco.org/geography/es/ev.php-URL_ID=2486&URL_DO=DO_TOPIC&URL_SECTION=201.html

prosperity, and realize human potential. The ICA strives to create a true hemispheric community by connecting the citizens of the Americas and promoting hemispheric integration through innovative uses of ICTs.

- FLACSO, the Latin American Faculty of Social Sciences²⁰, has an active branch in Buenos Aires²¹, where research on ICT is developed by the Communications Program, as well as by the Development based on Work, Gender, information, and Knowledge Program²².

5 Private enterprises

In the private sector, in 2003, enterprises financed 26.1% of all national expenditure in RTD, and the rest of the private sector (private universities and NGOs) 3.6%. The National Plan of Science, Technology and Innovation calculate approximately the participation of enterprises in 2005 at more than 28% of the national expenditure.

4. THE MAIN ACTORS ACTIVE IN ICT R&D

4.1 THE IMPORTANCE OF THE PUBLIC SECTOR

According to the Indicators available from the last National Survey carried out by SECyT²³, in 2004 the distribution of researchers (including grantees) during the period shows the relevant of the public sector in the scientific system: 83% of the researchers are carrying on their activities in public institutions (29% in the governmental sector, and 55% in public universities), while a scarce 10% works in enterprises. According to Marí (2005), the Indicators available from the last National Survey carried out by SECyT show that in 2003 public universities executed 25.7% of the total national expenditure in RTD, and private universities 1.6%; public institutes (INTI, INTA, CNEA, CONAE, etc.) executed 41.2%; enterprises executed only 29%; they finance 26% and receive the rest as subsidies and credits from the Agencia of SECyT (98 million pesos from the national Budget, or about 26 million Euros, plus 20 million -5.3 million Euros from a program of tax credit). NGO executed 2,5%.

4.2 ICT RESEARCH

Even if Argentine universities develop 80% of the S&T research in the country, it is difficult to know exactly which research, discoveries or S&T advances they generate each year (Finquelievich and Prince, 2006). SECYT's indicators, published in 2006²⁴, do not discriminate which research are carried on ICT issues. However, of a total of 20241 research project developed in 2005, 6105 projects belong to the area Engineering and Technology, the highest proportion among all sectors.

²⁰ <http://www.flacso.org/>

²¹ <http://www.flacso.org.ar/>

²² http://www.flacso.org.ar/investigacion_ayp_contenido.php?ID=120

²³ http://www.secyt.gov.ar/indicadores_2005/Indicadores_2005_indice.pdf

²⁴ http://www.secyt.gov.ar/indicadores_2005/Capitulo%20VI.pdf

Nevertheless, the Annex IV of the “Basis for a Mid-Term Strategic plan in Science, Technology and innovation” has identified the research project concerning ICTs that have been funded by FONCYT / ANPCYT between 1997 and 2003.

The total number of projects is 3000, of which 103 projects concern ICT, involving 385 individuals. An important proportion of these research funds (7.076.620 Pesos of a general total of 8.823.790 Pesos) are granted to universities, followed by CONICET (1.313.741 Pesos).

Finkelievich and Prince (2006) have researched about the use of ICT, including research on these issues, in Argentine universities. The analysis of the answers provided by the 23 universities and the 11 Faculties that were interviewed allowed the authors to build a typology of universities, classifying them in:

- Advanced (17,39% of the consulted universities)
- Emergent (43,47% of the consulted universities)
- Reluctant (39,14% of the consulted universities)

Advanced universities are the smaller group within the studied universe (four universities). Not only do they use ICT in the areas of administration, teaching, research and extension, but they also fulfil the fundamental characteristic of the Information Society: to work in networks with academic units and outer institutions external to the universities, of the academic world, as scientific networks of electronic base, or supported by another type of communications, such as national state and/or local institutions, companies and NGOs. In these networks, among other projects, researches concerning ICT issues are developed, both technological research and social research. These universities participate of enterprises’ incubators, technological parks and technopoles, and they are open to funds from diverse sourced, including the State, the private sector, and international organizations.

Advanced Universities include the University of Buenos Aires, the National University of Cuyo, the National University of Córdoba and the National University of Rosario. All of them are public. Among them (essentially due to UBA’s population) they gather 545.396 students, 65,28% of the public universities’ population, and 51,90% country’s university population.

However, Intermediate universities are also working with ICT research:

Main Universities working on ICTs (Finkelievich and Prince, 2006):

- Universidad Nacional de Buenos Aires, UBA
- Universidad Nacional de Rosario, UNR
- Universidad Nacional de Córdoba, UNC
- Universidad Nacional de La Plata, UNLP
- Universidad Nacional de Cuyo, UNCuyo
- Universidad Nacional del Sur, UNS
- Universidad Nacional del Litoral (UNL)
- Universidad Nacional del Centro de la Provincia de Buenos Aires

As for social and economic research on ICT, within the academic sector ICT have still a marginal space. There is research being developed, but in general there are individual efforts by scholars that have been working on ICT issues for a certain time. In the Faculty of Social Sciences, University of Buenos Aires, there is an Information Society Research Program²⁵. There are also extremely productive research groups working on ICTs social and economic issues at the University of General Sarmiento (Instituto de Industria (IDEI)²⁶, University of Quilmes²⁷ (Instituto de Estudios sobre la Ciencia y la Tecnología)²⁸, and University of San Martin, all of them in the Buenos Aires Province. Two private Universities in the City of Buenos Aires are starting Research Centres on Information Society issues: the Instituto Tecnológico de Buenos Aires (ITBA), and Universidad San Andres. As mentioned above, another private institution, FLACSO, develops research about information, knowledge and gender related to work.

4.3 THE RELATIONSHIPS BETWEEN UNIVERSITIES AND ENTERPRISES FOR ICT RESEARCH AND PRODUCTION

According to the “Basis for a Mid-Term Strategic plan in Science, Technology and innovation” (Annex IV), one of the key factors that condition ICT research as well as ICT development in Argentina in the absence of public institutional policies’ approaches. The ICT issue is disseminated in various governmental institutions, at State level as well as in the Provinces, lacking instruments that could ensure the efficient coordination of efforts.

Another relevant issue concerns the relationships between Universities, high technology enterprises, and research programs. Permanent interaction between these three elements is key for ICT development. In Argentina there is currently a weak but increasing relationship between research Institutes and Universities, and an almost inexistent relationship between both of them and the ICT private enterprise sector.

However, some relevant universities are participating, together with enterprises, in technopoles²⁹. Technopoles, or technological parks, are growing in Argentina, with the still feeble participation of universities. SECYT has implemented a Special Program for Incubators, Technological Parks and Technological Poles (Programa Especial de Incubadoras, Parques y Polos Tecnológicos), in which universities are taking an increasing part. To mention a few examples, the Instituto Tecnológico de Córdoba³⁰ (ITC), which is working since 2002, is constituted by six universities in the Córdoba Province, and the Clúster Córdoba Technology. The Universidad Nacional de Cuyo (Mendoza) participates in the Palmira Technological and industrial park (Parque Tecnológico e Industrial de Palmira - PASIP). It will include a technological center, an incubator for technology-based enterprises³¹.

²⁵ <http://www.iigg.fsoc.uba.ar>

²⁶ <http://www.unqs.edu.ar/idei/index.htm>

²⁷ <http://www.unq.edu.ar/>

²⁸ <http://www.unq.edu.ar/layout/redirect.jsp?idSection=604>

²⁹ Data from Susana Finquelievich & Alejandro Prince: “Universidades y TICs: Las Universidades argentinas en la Sociedad del Conocimiento”, Telefónica, Buenos Aires, 2006.

³⁰ <http://www.fitc.unc.edu.ar/>

³¹ <http://weblogs.cfired.org.ar/blog/archives/000795.php>

The Universidad de General San Martín is part of the Polo Tecnológico Constituyentes (PTC), jointly with INTI, INTA, CITEFA, SEGEMAR and CNEA. The PTC was created in 1999, as an interface organization that allows the generation of synergies among its own institutes and private activities, as well as with local, national and international R&D centres³².

The Universidad Nacional de Misiones participates in the Parque Tecnológico de Misiones, together with the Misiones Government, **INTA**³³, and enterprises in the cities of Posadas, Oberá and Eldorado. Until today, it is the only binational technological park – jointly with the Universidad de Pato Branco, Brazil. It's financed with National S&T funds.

The Universidad Nacional de Mendoza integrates the Institute of Industrial, Services and Technologic Development - IDITS³⁴ (Instituto de Desarrollo Industrial, Tecnológico y de Servicios), a mixed initiative integrated also by the Mendoza Province's Government, and private enterprises. The Universidad Nacional del Sur is one of the promoting entities of the Bahía Blanca Technological Pole (Ente Polo Tecnológico de Bahía Blanca) still in its first steps. Its members are the Bahía Blanca Municipality; Bahía Blanca Honourable City Council; Ente Zona Franca; Universidad Nacional del Sur; Universidad Tecnológica Nacional; Facultad Regional Bahía Blanca; Fundasur; Plapiqui; Vianet Computación; Jotafí S.A.; Tecnodesarrollo S.A.; Cámara de Informática del Sur; Unión Industrial de Bahía Blanca; Centro Regional de Investigaciones Básicas y Aplicadas de Bahía Blanca; Corporación del Comercio, Industria y Servicios de Bahía Blanca, and APYME³⁵.

The [Polo Tecnológico Rosario](#)³⁶ groups private enterprises, universities and the State government. Its Directive Commission includes the [Municipalidad de Rosario](#), the Santa Fe Province Government, the [Universidad Nacional de Rosario](#)³⁷, and the enterprises Assist S.A., Antológica, BLC S.A., Fundación Libertad, Grupo Consultar, Grupo Tesis, Ksoft, BI Consultants, Openware, Soluciones Punto Com, and Suasor. This group's goal is to impulse the city of Rosario as a world reference centre in ICT and [biosistemyc](#) technologies. The focus is put on the production of software in Spanish, and on the use on high technology production in order to accelerate the integration of Rosario Metropolitan Area to information Society. Its main objective is to disseminate ICT applications as well as the links between the S&T sector, the government and the private sector, and to encourage education, training, and qualified labour in high added value activities.

The Universidad de Buenos Aires participates in the BAITEC³⁸ Program, the City of Buenos Aires' Government's Incubator of Technology- Based Enterprises

³² <http://www.ptconstituyentes.com.ar/>

³³ <http://www.inta.gov.ar/>

³⁴ <http://www.idits.org.ar/principal.shtml>

³⁵ <http://www.bahiablanca.gov.ar/empresario/polotec.html>

³⁶ <http://www.polotecnologico.net/es/>

³⁷ <http://www.unr.edu.ar/>

³⁸ http://www.buenosaires.gov.ar/areas/produccion/tecnologia/baitec.php?menu_id=10248

4.4 PRIVATE SECTOR'S INITIATIVES

The experts that wrote The Bases' Annex IV considered that various enterprises related to the ICT sector have developed serious efforts to develop and export new technologies, and most of them have been successful. Around 600 enterprises –many of them microenterprises- are producing equipments and systems, for the national as well as for the international market.

Yoguel et.al.³⁹ have developed research on the use and dissemination of ICT in Argentinean manufacture industry. The research work focuses on two areas: the real reach of ICT use and dissemination and its links with the enterprises' general productivity, work organization and competitiveness. After analyzing 246 enterprises, the authors have concluded that ICTs are widely disseminated in industrial activities, and that most enterprises have invested in ICTs, mainly during the “convertibility” periods, in which one Peso equalled one American Dollar. Nevertheless, these technologies are used mainly in the administrative tasks, more than in the production processes. In both areas, ICT tools are unsophisticated and show low complexity.

However, the panorama is changing. Besides the technopoles' initiatives mentioned above, in 2007, the Mar del Plata ICT Association -Asociación de las TIC de Mar del Plata⁴⁰ (ATICMA) - has promoted an interesting regional initiative. On March 29 and 30 they organized the First National Forum on ICT Experiences⁴¹. In this forum, representatives of different technological poles, clusters, entities and ICT industry chambers exchange experiences. Most important, they have signed the Foundational Act of the Federal Council of Software and informatics Services Enterprises - Acta Fundacional del Consejo Federal de empresas de Software y Servicios Informáticos (CFESSI).

ATICMA has launched its operative unit's project. Its goal is to create in Mar del Plata a Technological Development Centre (Centro de Desarrollo Tecnológico - CDT), which will develop R&D activities in the areas of hardware, software, ICT management and quality; a Centre for assembling electronic plaques and integrating equipments (Centro Integral de Armado de Plaquetas Electrónicas e Integración de Equipos, CIPEE), and a Training Centre that will satisfy the present demand for human resources. It will work jointly with universities, technological schools and C&T institutions.

4.5 NGOS AND RESEARCH

Only 2% of S&T researches in Argentina are developed by non-governmental organizations. Of these, only a few develop research on ICT. Nine of these organizations are grouped in the Argentine Network of Digital Organizations – RODAR, <http://www.rodargentina.net>⁴². NGOs carry on research with funds from international organizations, such as IDRC, UNESCO, etc., or the National State.

³⁹ Gabriel Yoguel, Marta Novick, Darío Milesi, Sonia Roitter y José Borillo, Información y conocimiento: la difusión de las tecnologías de información y comunicación en la industria manufacturera argentina, R E V I S T A D E L A C E P A L 8 2 • A B R I L 2 0 0 4.

⁴⁰ The Mar del Plata ICT Association is a non profit organization which gathers enterprises, professionals, and educational institutions from the ICT industries. Created in 2006, its goal is to achieve partnerships between enterprises, educational and technological institutions, professionals and governments in order to encourage ICT development in the productive sector.

⁴¹ <http://www.canal-ar.com.ar/Noticias/NoticiaMuestra.asp?Id=4311>

⁴² See <http://www.rodargentina.net/OSCs.php>

5. THE MAIN ICT R&D THEMES

5.1 THE MAIN THEMES ON WHICH ICT RESEARCH IS CONCENTRATING IN THE COUNTRY. LEADING INSTITUTIONS

The main themes are carried on by Universities and the private sector. There are not specifically recognised “flag issues”, although open source, security/safety, intellectual property, software for agricultural activities, e-government, e-vote, and mobility, are among the significant themes.

Besides Universities, leading institutions belong to the private sector: enterprises such as IBM, Microsoft, Intel, Telefonica, Telecom, Motorola, are developing research.

Public sector

- Mechanisms to facilitate financing of ICT Research (fiscal benefits, subsidies for marketing, venture capital, etc.);
- Education and training in ICT careers
- Multistakeholders’ strategies and actions
- Telecommunications infrastructure
- E-government;
- Intellectual property
- ICT indicators
- Safety and security
- ICTs and Universities
- Electronic waste

Private sector

- Education and training in ICTs careers
- Networking mechanisms with ICT enterprises and clients, investors, etc., within the country and abroad.
- Mobile and ubiquitous computing, security and dependability.
- Interactive computing: contents, games, e-learning, e-commerce, e-government.
- Software for education, agricultural activities, health,

Community sector

- ICTs and poverty reduction
- Open software
- Wi Fi, Wi Max
- ICTs and Universities
- Accessibility
- Digital Gap

5.2 POSSIBLE SPECIFIC FUTURE DEVELOPMENTS IN THE COUNTRY

- a. Argentina is interested in finding **markets for exports**. Experts estimate that it can find a significant place in the world's markets if C&T policies encourage areas in which there already are certain degrees of development: biotechnology, nanotechnology, functional foods, "clean" energies, biofuels, textile technologies, software, oceanographic studies, nuclear energy, transportation, climatic change studies, among others.
- b. A possible specific future development is **S&T Software**: nuclear, engineering, network optimization applications, logistics, traffic, biology, chemical models, graphic tools and applications, etc.
- c. **Network and service infrastructures** need to develop social planning of ICTs, particularly concerning telecommunications networks. A probable future development in the short run is S&T Software: nuclear, engineering, network optimization applications, logistics, traffic, biology, chemical models, graphic tools and applications, etc. ICT for Sustainable energy management is also an urgent issue.
- d. Research needs in the field of **cognitive systems, interaction, and robotics** point to areas such as transportation, metal mechanic industries, prospective research, robot Communication and coordination, computational mechanics, robotics in surgery, and Human – Robots interaction.
- e. Possible future developments in **Components, systems, and Engineering** are: Biotechnology, Nanotechnology, functional foods, "clean" energies, biofuels, textile technologies, software, oceanographic studies, nuclear energy, transportation, and climatic change studies, among others.
- f. **Digital libraries and content** are growing research and implementation subjects in Argentina. Some of the areas to be developed in the immediate future are Electronic S&T digital libraries, networks of Digital libraries, intelligent contents for Digital libraries, and Contents' Classification.
- g. ICT for health is also a developing issue. The following areas are being developed and will acquire increasing importance in the short run: Telemedicine (clinical uses); Teleeducation; Epidemiology and Statistics; Management and Administration; Standards and legal aspects of Informatics applied to health; Codification and controlled terminology; Ontologies in Biology and Medicine; Hospital Information Systems; Computerized Clinical histories; Expert Systems and Artificial Intelligence in medicine; Data warehousing in Health; Data Mining in Health; Personal health systems for monitoring and point-of-care diagnostics; advanced ICT for risk assessment and patient safety; Storage, transfer, and processing of Medical Images⁴³.

⁴³ See the Conclusions of the First National Conference on Compatibility Criteria in the Development of ICT based experiences for Health (http://www.setcip.gov.ar/pype/documentos/Conclusiones_1er_Encuentro_Nacional_Telesalud.pdf)

- h. **ICT for mobility & sustainable growth.** IP Telephony, Multi medial solutions, Security in IP communications, Telecommunications Cooperatives; ICT for the intelligent vehicles
- i. **ICT for independent living and inclusion** is increasingly important in ageing country, such as Argentina. ICT provides a most important opportunity to address the problems associated to the ageing population such as the associated rise of number of people with high disability rates, fewer family carers, and a smaller productive workforce. It also offers important means to integrate people at risk of exclusion and empower individuals to participate in the knowledge society. Some of the issues to be developed are: Embedding accessibility in mainstream ICT; Computer simulation of the user interaction; Non-invasive Brain Computer Interaction ; ICT for Social Inclusion of young people, ICT for Social Inclusion of elderly people; ICT for Social Inclusion of marginalized groups; Advanced Prototype Systems for Independent Living and Active Ageing; Open Systems Reference Architectures, Standards and Platforms
- j. **E-politics and E-government** are becoming increasingly important: issues such as digital cities, e-vote, online consultations, qualitative e-interviews, e-surveys, online focus groups, community networking, etc., require further research and development.
- k. Gender issues and ICT research is carried on by FLACSO Argentina. The issues tackled are Women's ICT-based enterprises, Women's empowerment though ICT, and Gender issues in ICT-based education
- l. Prospective research on ICT Issues is being carried by OPCYT at SECYT. The main themes are the software industry, as well as the future industrial development of the sector.