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D3.1 Analysis of the National ICT policies of the five target countries _ Resubmitted

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1 EXECUTIVE SUMMARY

During the last 10 years ICT policies have started to be considered as an important tool for the economic development in all Latin America countries. Due to this fact ICT policies have begun to appear in the national development plans either as a part of this plan either as an important independent horizontal policy.

Telecom liberalization policies have been followed soon by Information Technology policies. Main focus of these policies has been education, e-Government and enterprise competitiveness.

Research ICT policies are relatively new and in some cases are not clearly identified. Anyhow there is a growing feeling about the benefits of the cooperation with the European Union in this field, taking profit of the opportunities aroused by FP7 and other bilateral cooperation programs.

ICT policies are basically national policies. It is important to state that in Latin America there is a strong national feeling and transnational cooperation is more a matter of declarations than of real interchange. In this landscape, the creation of common research ICT policies (as for instance in Europe) looks very difficult and maybe is more realistic to establish LatAm cooperation links in this field at a lower level, for example in programs and instruments.

The following paragraphs provide a summary of the national priorities in ICT policies for the targeted countries.

Brazil:

ICT policies are a part of the Productive Development Policy (PDP) launched in 2008 and focused on the enhancement of productive structure efficiency, improvement of Brazilian companies' capacity for innovation and expansion of exports, as a means to achieve better economic efficiency, development and dissemination of technologies with a higher potential for competing internationally.

The current policy (PDP) intends to build the confidence in the ability to grow and to promote long-term competitiveness of the Brazilian economy, focusing on four main challenges:

- First challenge is to steadily expanding supply capacity to meet a growing demand, avoiding the formation of any bottlenecks or inflationary pressures that can shorten the virtuous path that are conforming.
- Second, it is crucial to preserve the robustness of the Brazilian balance of payments, provided that in recent years, contributed decisively to the strengthening of the economy.
- Third, it is to increase the innovation capacity of Brazilian enterprises.
- Finally, it is also vital to make room for new players, broadening the conditions of market access for micro and small enterprises (SMEs).

Inside PDP, enterprises are entitled to ask for fiscal incentives in the case of R&D activities.

Colombia

In Colombia, although there have been several tools, as laws, initiatives and guidelines[1], which

[1] As the National Plan of Scientific, Vision Colombia 2019, Technological and Innovation Development 2007 -2019 (PNDCT+I), Law 1286 of 2009 (Science and Technology Law) and CONPES 3582 of 2009 (National Policy on Science and Technology), among

have contemplated the use and incorporation of ICT in different areas (e-government, e-business, e-learning, e-health, e-employment, e-environment, e-agriculture and e-science), it is only with the transition process from the telecommunication sector to ICT, as consequence of the market behaviour and convergence, that the Colombian government began to design tools focused on ICT as a whole.

The more important of those policies is the National ICT Plan, created in 2008 by the (also newborn) Ministry of Information and Communication Technologies, as the national strategy for the use of ICT in Colombia, which intended to contribute to the digital inclusion and social equity policies and to increase the productivity and competitiveness, resulting in Colombia's social development and higher welfare of the population. In addition, the National ICT Plan (PNICT) proposes a group of policies, actions and projects in four vertical axis making reference to programs that help achieve a better appropriation and use of ICT in priority sectors for the PNICT: (1) Education, (2) Health, (3) Justice, and (4) Enterprises competitiveness; and four horizontal axis, covering subjects and programs that affect different sectors and groups: (1) Community, (2) Legal and normative frame, (3) Research, Development and Innovation, and (4) On-line government.

Argentina

ICTs have been mentioned as a strategic priority for Argentina, but presently no specific priorities have been established within the sector. It is worth mentioning that there is a specific plan to foster the software sector (FONSOFT). The agent responsible for this instrument is the National Agency for Scientific and Technology promotion, depending upon the Science, Technology and Productive Innovation Ministry. Furthermore, the National E-Government Plan can also be seen as a useful tool aimed to foster the ICT sector.

Argentina is endowed with several technological hubs and IT clusters operating in many cities along the country. In this locations, leading multinational firms, domestic SMEs and universities work hand in hand achieving synergies and increasing competitiveness. Buenos Aires currently concentrates 49% of total firms. In particular, the "Polo IT Buenos Aires" comprises more than 80 domestic SMEs, 46% of which export to 15 different countries. The cluster "Córdoba Technology" agglutinates 100 firms. One of the pillars of Córdoba's economic activity is the dense presence of universities

Mexico

Mexican Government has stated ICT development a national priority issue in the National Development Plan (2007-2012). The Mexican Government named four main development areas: 1) Development of Software Industry, 2) Development of Digital Supply Chain, 3) e-Government , and 4) a strategic development and implementation of information and communication systems based on state of the art technology to confront organized crime. However Federal spending on Science and Technology as % of GDP was 0.45 (32,487 million of pesos), still below the global average. Mexico counts with a *Special Science, Technology and Innovation Program (2008-2012)*, which aims to strengthen the social appropriation of knowledge and innovation, as well as effective coordination of all involved parties, but there is still missing clarity and strength in the research and innovation policy for the ICT sector.

others; developed by entities as the Ministry of Information and Communication Technologies, National Planning Department (DNP), The National Council of Economic and Social Policy (CONPES) and COLCIENCIAS.

ICT research is mainly conducted in public and private universities and public research centers. The National Council for Science and Technology (CONACYT) is the leading national funding agency for research and innovation.

The instruments used to support the previous and present ICT policy have mainly the intention to strengthen the ICT industry through the elimination of importation tariffs on raw material or other inputs used in the ICT industry, stimulating the investment in electronic industry in Mexico, or the creation of clusters or new ICT companies. Recently created instruments foster innovation and collaboration between industry and research centres, which includes among others the ICT sector.

Industry Clusters located in Mexico were driven by demand: they are located in areas characterized by strong economic activity. Because the barriers to entry in the software area are relatively low, the creation of new businesses to serve local clients was relatively fast since the past decade. However, in some cases the process of growth has been sustained mainly by strong involvement of transnational corporations (Microsoft, IBM, Oracle, SAP) and ICT Clusters. By now, there exist 21 ICT Clusters distributed all over Mexico.

Since June 2010, a National Digital Agenda is under development with the participation of all stakeholders in the ICT sector.

Uruguay

Since February 25, 2010 Uruguay counts with a "Science, Technology and Innovation National Strategic Plan" (PENCTI). The PENCTI is part of the so-called "Uruguay Innovator" that is a proposed reform of public policies aimed at developing the capabilities of the National Innovation System in Uruguay. This is part of the new institutional design that began in April 2005 with the creation of the Ministerial Office of Innovation (GMI). Subsequently, since December 2006 the GMI has a central role in setting policy and strategy guidelines in Science, Technology and Innovation. There are also two other relevant actors: the National Agency for Research and Innovation (ANII) operational arm of government policies and priorities of the Executive on the subject, and the National Innovation Council of Science and Technology (CONICYT), which was expanded and revitalized as a consultative and advisory body of the system.

The Digital Agenda is one of the instruments in force for ICT development. Its main objectives are the identification, prioritization and monitoring of programs and strategic projects to advance in the development of ICT; and, in prioritizing strategic plans and projects, organizing and disseminating in order to establish an overview and to promote continuity and projection based on monitoring and consistency mechanisms.

Costa Rica

In 2004 was launched the National Plan for Information Technology. The design process of the proposal was made by the Information Technology Chamber of Costa Rica (CAMTIC), the International Economic Policy Centre of the National University (CINPE), Centre for Technology and Informatics Management (CEGESTI) and experts from the University of Oslo in Norway.

Also, the Ministry of Science and Technology, supported by the Innovation Directorate, seeks to consolidate the System of Science, Technology and Innovation (SCTI), with the aim of achieving more coordination among academia, government and private sector.

Finally, there is a strategy for long-term development - XXI Century Strategy 2004-2050 – which seeks to promote the integral development of Costa Rica, through a platform founded on: education, science and technology and innovation. The initiative is funded by the Foundation for Cooperation Costa Rica-United States (CR-USA). In 2006, the National Centre for High Technology (CENAT) of the National Council of Rectors (CONARE) agreed to host the implementation.

2 INTRODUCTION

2.1 Objectives

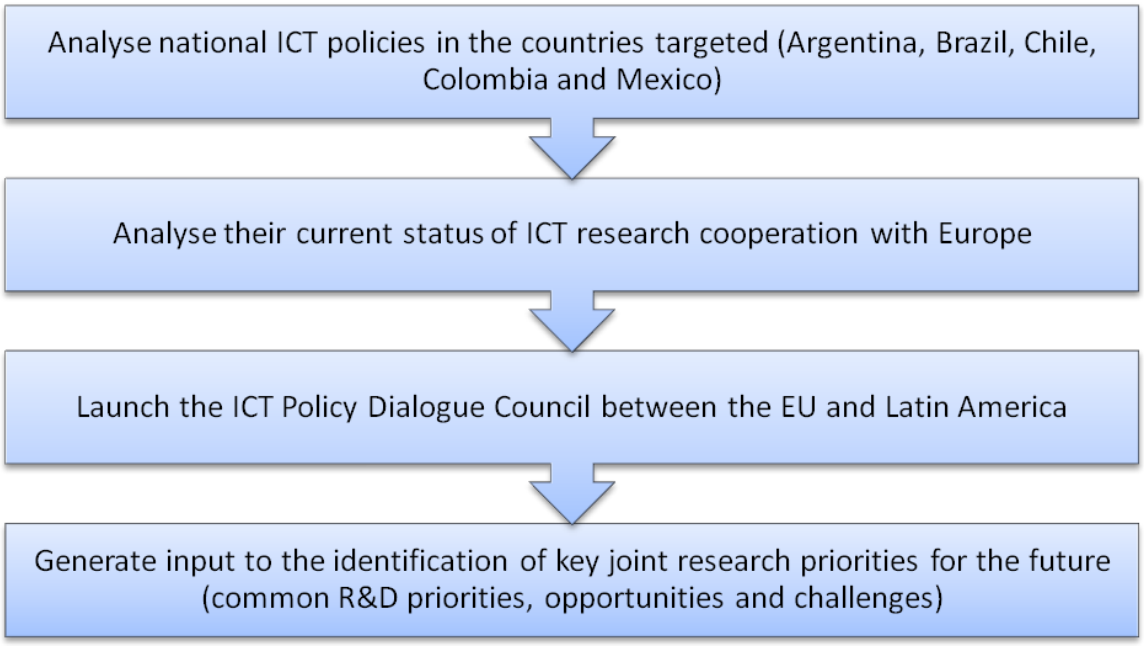
The main objective of Task 3.1 under WP3 is to produce an executive report in which ICT policies and strategic priorities will be summarized and clearly explained. For ICT policies we mean the key political orientations setting the framework for the development of ICT of each target country.

These policies should be seen as a series of principles and strategies applied to the field of information and communication technologies (ICT) providing orientation to design a strategy and programs to develop and use information resources, services and systems. What we consider an ICT policy is therefore a series of such policies.

The present report is the result of Task 3.1 and reflects the output of the in-depth analysis of national ICT policies performed by FORESTA partners in Argentina, Brazil, Chile, Colombia and Mexico, as well as Uruguay and Costa Rica. In parallel, a mapping of the main agents responsible for defining and/or implementing these policies has also been performed in each of these countries. Such comprehensive analyses are a necessary step in order to facilitate the identification of future trends and areas of common interests and associated recommendations for follow-up actions.

ROSE, as task leader has coordinated the individual analyses.

The purpose of this report is to provide input to a council of experts (to be set up under this WP), which will then generate a list of common R&D priorities, opportunities and challenges following a discussion process. The list will focus particularly on long-term perspectives.



Therefore, this report will generate input to the identification of key joint research priorities for

the future, complying with the global objectives of WP3:

- Support European competitiveness and jointly address, with Latin America, issues of common interest and mutual benefit, thereby supporting EU policies;
- Improve scientific and technological cooperation for mutual benefit of the EU and Latin American countries;
- Provide support to information society policy dialogues and contribute to increasing the involvement of Latin American organisations in cooperation projects implementing ICT policies of common interest with EU counterparties;
- Facilitate the widest diffusion and local exploitation ICT policies and cooperation programmes.

2.2 Methodology

ROSE, as a coordinator of the Task 3.1, has defined the methodology and the structure of the work to be accomplished by the LatAm partners. This definition is included in three separate documents provided to the LatAm partners:

- Guidelines for the national ICT analysis – detailing the scope of the task, planning and responsibilities, and main areas of analysis. Through the first information provided by partners it was possible to access which data was available in each country and better share the final template of D3.1
- Feedback on Guidelines for the National ICT Analysis – providing clarifications for the questions that partners had when filling in the information of the guidelines
- Overview of national ICT policies – describing the main data sources, examples of public action for R&D financing, and useful links that partners could use in its national analysis.

The results of the analysis performed have been integrated by ROSE in the present document composed by the national executive reports of the targeted countries in which ICT policies and strategic priorities are summarized and clearly explained.

To provide a wider view on the critical elements for ICT, each national executive report is composed by two main issues: a) the ICT policies of the target countries and b) context and situational analysis.

> a) The ICT policies of the target countries: includes the selected ICT policies that have been studied in detail to include key elements for policy design, development and implementation
>
> b) Context and situational analysis: provides a wider view on the decision-making process, describing the national context of the ICT sector and the main stakeholders with influence in the ICT field. In addition, it includes a SWOT analysis in what concerns ICT development.

a) The ICT policies of the target countries

Each of the selected ICT policies has been studied in detail to include key elements for policy design, development and implementation:

- Policy goals

- Priority lines
- Ministry coordinating the policy
- Policy scope
- ICT sectors addressed
- Reference to national/regional cooperation
- Main instruments associated to the policy (programmes, initiatives, projects)
- Managing organizations per instrument
- Budget assigned to each instrument
- Important policy documents

b) Context and situational analysis

In order to provide a wider view on the decision-making process, an analysis was performed about of the national context, to interpret the information situation and identify development issues to be addressed in the future. This assessment has also involved interested stakeholders to elicit their perceptions of the importance of information as a key element of development.

Context and situational analysis assesses the following areas:

- ICT sector overview
    - Description of the evolution of key indicators of the target countries for a better perception of the national situation and capacity to implement the ICT policies
    - Structure and relations of governmental organizations with competences in ICT policies
- Main stakeholders of the ICT field
    - ICT associations
    - Companies of the ICT sector
    - Funding agencies
    - Higher education institutions
    - Research organizations (public and private)
    - Entities participating in R&D projects
    - Other reference institutions from the research community
- SWOT analysis of national ICT policies
    - Analysis of the opportunities and threats faced by the country, in what concerns ICT development, as well as the strengths and weaknesses.

Methodology followed internally by the FORESTA LatAm partners for the analysis of national policies has been basically cabinet work, looking in each case for the adequate national information sources, accompanied by consults to several experts.

FORESTA partners in Latin American countries are key entities in their respective R&D ICT environments and, consequently, they are excellent points of reference for ICT policy dialogue analysis, since they are all strategic partners in these dialogues.

The partners responsible for the individual analyses are:

- Argentina: UP
- Brazil: USP
- Chile: UTEM
- Colombia: CINTEL
- Mexico: ITESM
- Uruguay and Costa Rica: ALETI

Coordination action with WP4 leaders has also taken place in order to assure that both deliverables were compatible and complementary.

Finally, this version 2 of the document, issued in March 2011, updates the information of version 1 (November 2010) taking into account the new situation as a result of the Presidential elections held in 2010 in five (Brazil, Colombia, Chile, Uruguay and Costa Rica) out of the seven Latin America countries considered in this document.

2.3 Structure of the document

The document is structured in three separate parts:

a) Executive summary and Introduction (points 1and 2), made by ROSE

b) National ICT policies (points 3 to 9), made by the LatAm partners

c) Annexes and References, made by the LatAm partners

The Executive Summary provides a quick overview to the description of the ICT national policies. Its extension (2 pages and a half) is a little big longer than the common in these cases due to the fact that its in necessary to consider independently the seven countries analyzed.

The Introduction describes the objective of the document, the methodology followed and the structure of the document

National policies (points 3 to 9) are structured in a harmonized way to make easier the comparison of ICT policies in spite of the important differences among the countries. This common structure is the following:

- ICT sector overview: key indicators, institutional structure
- National ICT policies: evolution and current status, instruments associated and managing organizations, important policy documents
- Main stakeholders of the ICT field
- SWOT analysis of national ICT policies
- Conclusions

Having in mind the profile of the high level experts (Council members and others) for which has been prepared the present document, the length of each national analysis has been established in 8 to 12 pages, sending to Annexes the rest of relevant information to be considered in a second or in depth lecture.

Annexes I to VII, include all the rest of the relevant information about national ICT policies in

Brazil (Annex I), Colombia (Annex II), Chile (Annex IV), Argentina (Annex V), Uruguay (Annex VI) and Costa Rica (Annex VII), as indicated in the previous paragraph.

Finally, the last point includes the References for a deeper study by the readers of certain specific and punctual aspects.

3 BRAZIL

3.1 ICT sector overview

Technological research in Brazil is largely carried out in public universities and research institutes, with more than 73% of funding for basic research still coming from government sources. In 2009, US$ 140 billion was invested at the ICT sector resulting on a growth from 6% to 8%. Among these sectors, telecommunications is the one with most investments, which should reach US$ 67 billion in the next 4 years, considering only investment by the private sector.

3.1.1 Key indicators

		2000	**2003**	**2006**	**2009**
1.	Country population (in millions) [1]	171	179	185	191
2.	GDP per capita (in US$ current prices) [2] [*US Dept. of State]	3765.67	3097.23	5868.11	8300.00* (2008)
3.	Weight of ICT in GDP (in US$) [1]	N/D	48 bil. 8.7%	96 bil. 8.8%	N/D
4.	% national budget dedicated to ICT	N/D	N/D	N/D	N/D
5.	Mobile subscribers in total / per 100 inhabitants [3]	22.8 mil./ 13,34	45.7 mil./ 25.56	85.6 mil./ 46.3	106.9 mil./ 56 (2008)
6.	Internet subscribers in total / per 100 inhabitants [4]	4.9 mil./ 2.87	23.6 mil./ 13.21	52.1 mil./ 28.18	71.66 mil./ 37.52 (2008)
7.	Broadband subscribers in total / per 100 inhabitants [4]	1.02 mil./ 0.6	0.95 mil./ 0.53	4.68 mil./ 2.53	10 mil./ 5.26 (2008)
8.	Internet penetration in total / per 100 inhabitants [3]	N/D	N/D	61.6 mil./ 33.3	74.5 mil./ 39 (2008)
9.	% of businesses with 10 or more employees using the Internet [3]	N/D	N/D	94,8%	91% (2008)
10.	Share of ICT-related occupations in the total economy in selected countries [1]	N/D	2,6%	3,0%	N/D

11.	Telecommunication services revenue in total [1] [3]	N/D	N/D	N/D	N/D
12.	Mobile telecommunication services revenue in total [1] [3]	N/D	N/D	N/D	N/D
13.	Telecommunication infrastructure investment in total [1] [3]	N/D	N/D	N/D	N/D
14.	Gross Domestic Expenditure on R&D - GERD (in US$) [5]	N/D	N/D	392 mil. (2007)	N/D
15.	ICT-related patents as a percentage of national total [6] • Patent applications to the EPO[2] • Patent grants at USPTO[3] • Patent Applications filed under the PCT[4]	 6,6% 27,4% 12,6%	 14,3% 30,5% 17,1%	 9,7% 40,9% 13,0%	 N/D N/D N/D
16.	Technology Balance of Payments (TBP)	N/D	N/D	N/D	N/D
17.	• Technology balance of payments: Receipts (million current euros)	N/D	N/D	N/D	N/D
18.	• Technology balance of payments: Payments (million current euros)	N/D	N/D	N/D	N/D
19.	Total number of ICT companies [1]	N/D	55 597	65 754	N/D

- *N/D means No Data available*
- *See explanations of each item of the table in Annex I*

Area	Companies	Institutions	Total
Telecom, Cellular	60,912,126.47	92,982,273.57	153,894,400.03
Computers and Peripherals	38,110,100.02	21,192,037.05	59,302,137.07
Telecom, Others	25,922,412.53	45,719,448.28	71,641,860.80
Other Areas	22,154,783.57	8,826,500.19	30,981,283.76
Bank Automation	20,788,697.56	2,607,851.34	23,396,548.90

[2] European Patent Organization
[3] United States Patent and Trademark Office
[4] Patent Cooperation Treaty

Industrial Automation	13,385,309.12	11,062,288.42	24,447,597.55
Business and Service Automation	9,474,885.39	10,213,790.44	19,688,675.83
Medical- and Hospital-related	5,257,464.88	1,073,836.76	6,331,301.64
Instrumentation	1,434,241.32	987,232.40	2,421,473.71
Total	**197,440,020.85**	**194,665,258.45**	**392,105,279.30**

Table 1 - Investments in R&D per Area (in US$, 2007)

Source: [5] – Informatics Law Results Report for 2007

3.1.2 Institutional structure

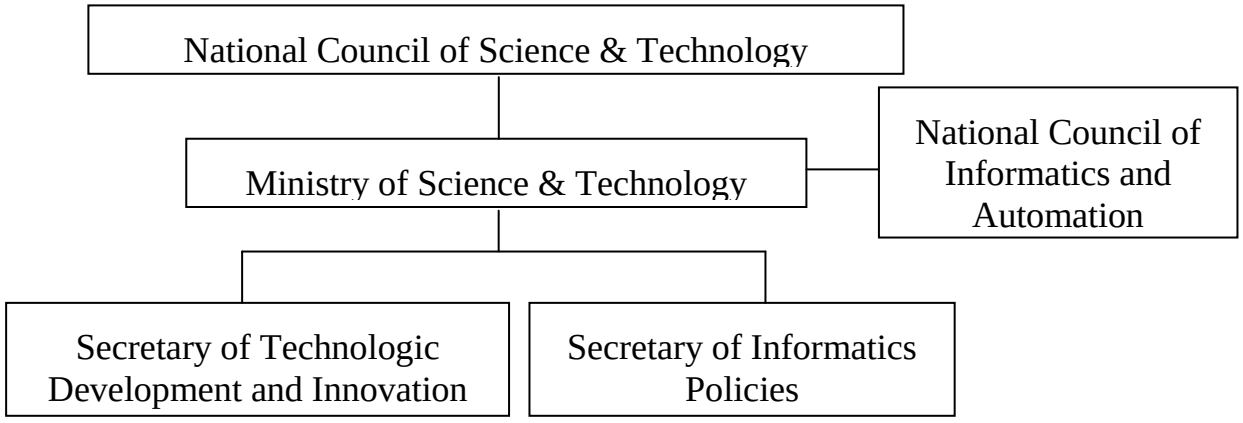


Fig. 1 - Structure and relations of governmental organizations with competences in ICT in Brazil

Fig. 2 - Structure of relation between governmental organizations and ICT industries

Note: The Ministry of Science & Technology is one of this Agency Components

Role of each entity:

National Council of Science & Technology **–** According to article 1º of law nº 9.257 from Sep 01, 1996, the National Council of Science & Technology (CCT) is "the top advisory body of the President for formulation and implementation of a national scientific and technological

development policy", exercised by the Ministry of Science and Technology (MCT). [5]

Ministry of Science & Technology **–** As a body of direct administration, the MCT is responsible for the following subjects: national scientific research, technology and innovation policies. [5]

National Council of Informatics and Automation – Or CONIN, a civil entity of private character, is the instance of organized society responsible for regulating the exercise of professional activities in IT and its related. [5]

Secretary of Technologic Development and Innovation – Or SETEC, is one of the four thematic departments of MCT which aims to propose, coordinate and monitor the National Technological Development Policy. [5]

Secretary of Informatics Policies – Or SEPIN aims to formulate policy proposals and programs nationwide related to Information Technology (IT). [5]

Brazil's Industrial Development Agency – or ABDI, is responsible for coordinating the actions and programs called "Strategic Highlights" ("Destaques Estratégicos"). [7]

3.2 ICT national policies

3.2.1 Evolution and current status of National ICT policies

The following points include a comparison between the current ICT policy and previous ICT policy, mainly in what concerns policy goals, priority lines, ministry coordinating the policy, sectors addressed and other relevant elements for the analysis:

- The previous policy was named Industrial, Technological and Foreign Exchange Policy (PITCE) established under Federal Law number 10973 (Dec 02, 2004). The current policy is the Productive Development Policy (PDP) published on 2008.
- In what concerns policy goals both policies (PITCE and PDP) are focused on enhancement of productive structure efficiency, improvement of Brazilian companies' capacity for innovation and expansion of exports, as a means to achieve better economic efficiency, development and dissemination of technologies with a higher potential for competing internationally. [7]
- The priority lines of the previous policy intended to achieve its goals through: innovation and technological development, external insertion, industrial modernization, production capacity and scale and strategic options. Meanwhile, the current policy acts on these aspects: innovation and technological development, exportation, attract external investment and strengthening of SMEs. [7]
- It is interesting to note that there has been a change in the ministry coordinating the ICT Policies. While the Ministry of Science and Technology (MCT) was responsible for PITCE, now it is the Ministry of Development, Industry and Foreign Trade (MDIC) which in responsible for PDP.
- Regarding the ICT sub-sectors affected by the policy, in PITCE we have 4 sub-sectors: IT components, IT equipment, telecom services and computer services and software. For

PDP we have 24 more.

- Finally it should be noted that these policies do not include references to national/regional cooperation nor international cooperation.

There are a few key differences between these policies. The first concerns the scope of the program. The current formulation is much broader than the previous one, PITCE. This policy, formulated in 2004, had limitations both on the side of the prioritized sectors (only four) and on the side of the instrument used. Still, PITCE created programs that collaborate to drive majors segments of the economy (such as programs to finance software and capital goods, and the legislation establishing incentives for the electronic components industry), and founded institutions capable of collaborating, more intensively, with the industrial policy, as in the case of the Brazilian Agency for Industrial Development (ABDI) and the National Council for Industrial Development (CNDI). The PDP benefits from the progress with PITCE, but goes much further by presenting a wide and diverse range of instruments and expand to 25 the number of sectors prioritized.

The second point concerns the adoption, by the new industrial policy, of best practices to guide the actions of such a policy. Another point regards the coordination and program management. Here also the PDP benefited from an earlier plan of government, in this case, in the area of infrastructure, PAC, which was precisely the concern for good management and decision-making capacity in key points for its implementation. The Ministry of Development, Industry and Foreign Trade (MDIC) are responsible for the overall coordination of PDP. [8]

3.2.2 Instruments associated to the ICT policies and managing organizations

The main instruments of ICT policy, i.e. the programmes and initiatives used to achieve policy goals, for PITCE included: public calls, programs to stimulate small businesses and fiscal incentives for companies with R&D projects. Meanwhile, the current policy (PDP) initiatives include: financing and investment, program to stimulate SMEs and fiscal incentives for companies with R&D projects. [7]

The organization/s managing these instruments, are the Ministry of Science and Technology (MCT) and the funding agencies: Foundation of Research Support of São Paulo State (FAPESP), Research and Projects Financing (FINEP) and the National Council for Scientific and Technological Development (CNPq) [7]

Both policies present, in general, the same instruments, however the PDP has a larger number of measures distributed according to macro goals established by the new industrial policy (increase participation of investments on GDP, increase participation of private investments on R&D, increase Brazilian exportations and stimulate SMEs). Information about the budget assigned to those organizations and the policy documents were not available.

3.2.3 Important policy documents

Document name *(original and English)*	**Reference year**	**Short description**	**Coordinating entity**
Política Industrial, Tecnológica e de Comércio Exterior –	2003	This document contains the policy objectives,	ABDI (Agência Brasileira de

PITCE Diretrizes *Industrial, Technological and Foreign Trade Policy – PITCE Guidelines*		characteristics and how the policy will be implemented	Desenvolvimento Industrial / Brazil's Industrial Development Agency)
Política de Desenvolvimento Produtivo – Inovar e investir para sustentar o crescimento *Productive Development Policy – Innovate and invest to sustain the growth*	2008	This document contains the policy objectives, characteristics and how the policy will be implemented	MDIC (Ministério do Desenvolvimento, Indústria e Comércio Exterior / Ministry of Development, Industry and Foreign Trade)

3.3 Main stakeholders of the ICT field

The main stakeholders of the ICT field in Brazil have been divided in the following groups: ICT associations, Companies of the ICT sector, Funding agencies, Higher education institutions, Research organizations (public and private), Entities participating in R&D projects, and other reference institutions. The complete list with names and URL is presented in ANNEX 1.

ICT associations

At this topic can be mentioned:

- The Brazilian Association of Information Technology and Communication Companies (BRASSCOM), created in 2004, with the objective of positioning Brazil as a key player in the global IT services market. [10]
- The Brazilian Computer Society (SBC) was established in July 1978 and is a leading resource for researchers, students and computing professionals working in the various fields of ICT, and for discussing the impact of computers in education and industry. [11]
- The Digital Port is the ICT Cluster with a focus on software development, located in Recife, the capital city of Pernambuco, in the Northeast of Brazil. Nowadays the role of Pernambuco in the global context has shifted towards emphasizing its human capital, entrepreneurship and innovation.[1] [12]
- The Information and Coordination Nucleus for .BR (Nic.br) was created to implement the decisions and projects of the Steering Internet Committee in Brazil (CGI.br), which is responsible for coordinating and integrating the initiatives of Internet services in Brazil. [13]
- The Brazilian Society for Scientific Progress (SBPC) is a civil entity, non-profit, dedicated to defense of scientific and technological advancement, and to educational and cultural development of Brazil. [14]
- The Brazilian Society for Technology Innovation (Protec), a civil association in favour of national technological innovation, is intended to stimulate, encourage and mobilize the various segments of society in any activity that promotes research and development of technological innovations made in the country, seeking to raise the competitiveness and business efficiency, in general, in production assets, processes and services. [15]

Companies of the ICT sector organized by subsector

IT Components

- Intel – Integrated Electronics Corporation. [16]
- AMD – Advanced Micro Devices [17]

IT Equipment

- IBM Brazil – Industry, Machinery & Services Ltd [9] [18]
- Nokia Corporation [19]
- Cisco Systems, Inc. [9] [20] [21]

Telecom Services

- Vivo S.A. [9] [22] [23]
- Telefonica [9] [24]
- Embratel – Brazilian Telecommunications Company S.A. [25]

Computer Services and Software

- Microsoft [9] [26]
- Oracle Corporation [9] [27]
- PromonLogicalis [9] [28]

Funding agencies

There are mainly three funding agencies in Brazil:

- *CNPq* – The National Council for Scientific and Technological Development is an agency of the Ministry of Science and Technoloy (MCT) responsible for the promotion of scientific and technological research and training of human resources for research in the country through concessions of 90 thousand scholarships. CNPq offers several types of scholarships for high school students, graduate, post graduate, recently doctors and experienced researchers, divided into two main categories: individual scholarships in the country or abroad, and scholarships for quota. Further support is provided by CNPq through research assistance. Among the various forms of assistance, there's the benefit to scientific publications, support for training of researchers through scientific exchanges and the promotion and attendance at meetings and scientific conferences. [29]
- *FINEP* – Research and Projects Financing, also known as the Brazilian Innovation Agency, is a publicly owned company subordinated to the Ministry of Science and Technology (MCT). Since its foundation, FINEP has had a double role: it provides grants to non-profitable institutions, such as universities and research centers, and it lends money to companies. FINEP has encouraged intense mobilization in scientific and business circles, funding the implementation of new research groups, the creation of specific programs, the growth of science and technology infrastructure, and the institutional consolidation of post-graduate activities. It has also stimulated the increase in supply and demand for technology, by mobilizing universities, research centers, consulting firms and contractors of services, products and processes. [30]
- *FAPESP* – Foundation of Research Support of São Paulo, with autonomy guaranteed by

law, is connected to the Ministry of Higher Education of the state government of São Paulo. With an annual budget exceeding $ 400 million over the past three years (equivalent to 1% of total tax revenue of the State), FAPESP supports and funds research, exchange and dissemination of science and technology produced in São Paulo. This institution supports scientific and technological research through scholarships and grants that address all areas of knowledge, with a total of almost R$ 94 millions invested in 2010. [31]

Higher education institutions

In this group, the most prominent institution is the University of São Paulo (USP). A public university, government agency linked to the Ministry of Higher Education of São Paulo. The talent and dedication of teachers, students and employees have been recognized by different world rankings, designed to measure the quality of universities from several criteria, especially those related to scientific productivity.

Currently, the most important rankings are of the Institute of Higher Education Shanghai Jiao Tong University and The Times. In the latest edition of Shanghai University (2009), which ranks the 500 best universities in the world, USP was in 115th position. The index of The Times is made up of 200 academic institutions world's most important and USP was, in 2008, in 196th.

The University of São Paulo holds about 28% of Brazilian scientific production which in 2006 was world's 15th, with 230 programs and 22 thousand students. It's also responsible for the formation of more than two thousand doctors per year, about 25% of the national total. [32]

Another institutions worth mentioning are the University of Campinas (UNICAMP) and the Federal University of Rio de Janeiro (UFRJ) with a scientific production of 1743 and 1516 respectively (9% and 7.8% of Brazilian production). It's also important to notice that the largest higher education institutions are mostly located at south and southeast regions of Brazil. [33]

Research organizations (public and private)

At this topic, we have the CPqD, an independent institution, focused on innovation based on information and communication technologies (ICTs) as contribution to the competitiveness of the country and the digital inclusion of society. With more than 1.200 highly trained professionals, CPqD presents broad programs of research and development, being the largest in Latin America in its area of operation, generating ICT solutions that are used in various industries: telecommunications, finance, electric power, industrial, corporate and public administration. [34]

Entities participating in R&D projects (entities participating in national/regional R&D projects, that don't participate in international projects)

In this group is worth mentioning the higher education institutes UNESP and PUC-SP. The first is one of the three São Paulo state universities, along USP and UNICAMP, distinguishing itself for its multiple campus structure comprising 23 cities [35]. PUC-SP with 19.971 students and 1.571 professors is the third most highly regarded of the State of São Paulo [36]. Besides these universities, it's worth mentioning the Institute of Technological Research (IPT), one of the biggest research institutes in Brazil, with 35.9 thousand technical productions on 2008, working primarily on four key areas: innovation; research and development; technology services, development and metrological support; and information and education technology.

3.4 SWOT analysis of national ICT policies

Strengths:	Weaknesses:	Opportunities:	Threats:
1.1 Focus on Innovation 1.2 Small and large companies' involvement 1.3 Incentives to intellectual property 1.4 Is connected to other governmental policies	2.1 Relies heavily on achieving international competitiveness as a pillar to succeed 2.2 Is greatly focused on the semiconductor industry development	3.1 Favourable macroeconomic environment 3.2 Recent and foreseen investments in infrastructure by the government 3.3 Opportunities complemented by coordinated actions in other areas, e. g. Tourism	4.1 Historically low growth rate in exports 4.2 ICT segments have contributed very little to the exports

1- Strengths

1.1 Focus on Innovation:

The current ICT Policy aims to research and develop not only technologies that are currently not available in the country, but especially new and innovative technologies. This is one of the main focuses, as opposed to previous policies that focused a lot on developing the bases for production of pre-existing technologies.

1.2 Small and large companies' involvement:

The previous ICT policies have usually focused on the development of agreements with large industries. The PDP, however, despite counting on the continued betterment of R&D in large industries, does not leave out the SMEs, considering that they can also be quite valuable for R&D, and recognizing that they are the country's main source of employment in the area.

1.3 Incentives to intellectual property:

The Brazilian Association of Intellectual Property (ABPI), an entity dedicated to study, diffusion and defence of rights of intellectual property, was founded in 1963 and has acted in a manner to cooperate with national and international authorities to modernize the disciplinary law of intellectual property, besides a fairly extensive set of mechanism aimed at encouraging and financing activities in technology innovation. These incentives can be through funding or tax benefits. For industry there's the National Bank of Development (BNDES) with credit lines for SMEs. At the academic, we can mention the Financier of Studies and Projects (FINEP) and the National Council for Scientific and Technological Development (CNPq), institutions connected to the Ministry of Science and Technology, being responsible for most of the research, graduation and post graduation funding.

1.4 Is connected to other governmental policies:

The PDP takes into consideration other governmental policies, including areas like tourism and international relations with Latin America, and considers this as being paramount to reaching the goals proposed by the policy. The bodies governing this policy also have influence in other areas and/or oversee other policies, making it easier for different areas to cooperate in order to achieve the proposed objectives.

2 – Weaknesses

2.1 Relies heavily on achieving international competitiveness as a pillar to succeed

Brazil does not have a history of being highly competitive in ICT areas where the international market is concerned. As a clear example of this, we have the fact that the Brazilian software production is one of the largest in the whole world, but most of it is aimed at the internal market. While the goal of developing exports bodes very well for the current policy, the fact that the country does not have a history of high exportation rates could jeopardize the development of this particular objective, making it a possible weakness for the PDP.

2.2 Is greatly focused on the semiconductor industry development

According to data provided by the European Information Technology Observatory (EITO) the ICT investment on Brazil will increase 6,1% in 2010, reaching the amount of 22,8 millions euros (about 50 million reais) invested. However, this is still very little compared to the 400 million reais already invested to open the first Latin America chip factory this first trimester and it's even less than the almost 900 million dollars (about 1.6 billion reais) invested on semiconductor industry in 2009. [9]

3 – Opportunities

3.1 Favorable macroeconomic environment

Brazil, as a result of democracy experienced since 1990, joined as a large emerging to the BRIC block (Brazil, Russia, India and China), with growth of its Gross Domestic Product measured at 9.6%, as disclosed in Aug 6, 2009. The focus above, aligned to the existence of so-called "Innovation Act " (Law number 10973, of Dec 02, 2004, which deals about incentives for innovation, scientific and technological research in the production environment), give clear signs of maturity macro- economic, explaining the good results achieved by the Brazilian economy.

3.2 Recent and foreseen investments in infrastructure by the government

The Growth Acceleration Program (PAC) will implement in 4 years a total investment in infrastructure of R$ 503,9 billion, divided in three crucial axes: Infrastructure Logistics, Energy Infrastructure and Social and Urban Infrastructure. This investment is a fundamental condition for acceleration of sustainable development in Brazil. Thus, the country can overcome the bottlenecks in economy and encourage an increase on productivity and a reduction of regional and social inequalities. [32]

3.3 Opportunities complemented by coordinated actions in other area, e. g. Tourism

As written on strength topic 1.4, the current ICT policy (PDP) takes actions considering other areas, e. g. tourism, making these different sectors cooperate with each other, in order to achieve the desired goals.

4 - Threats

4.1 Historically low growth rate in exports

Through analysis of these two graphs it is possible to study the growth rate in exports from Brazil.

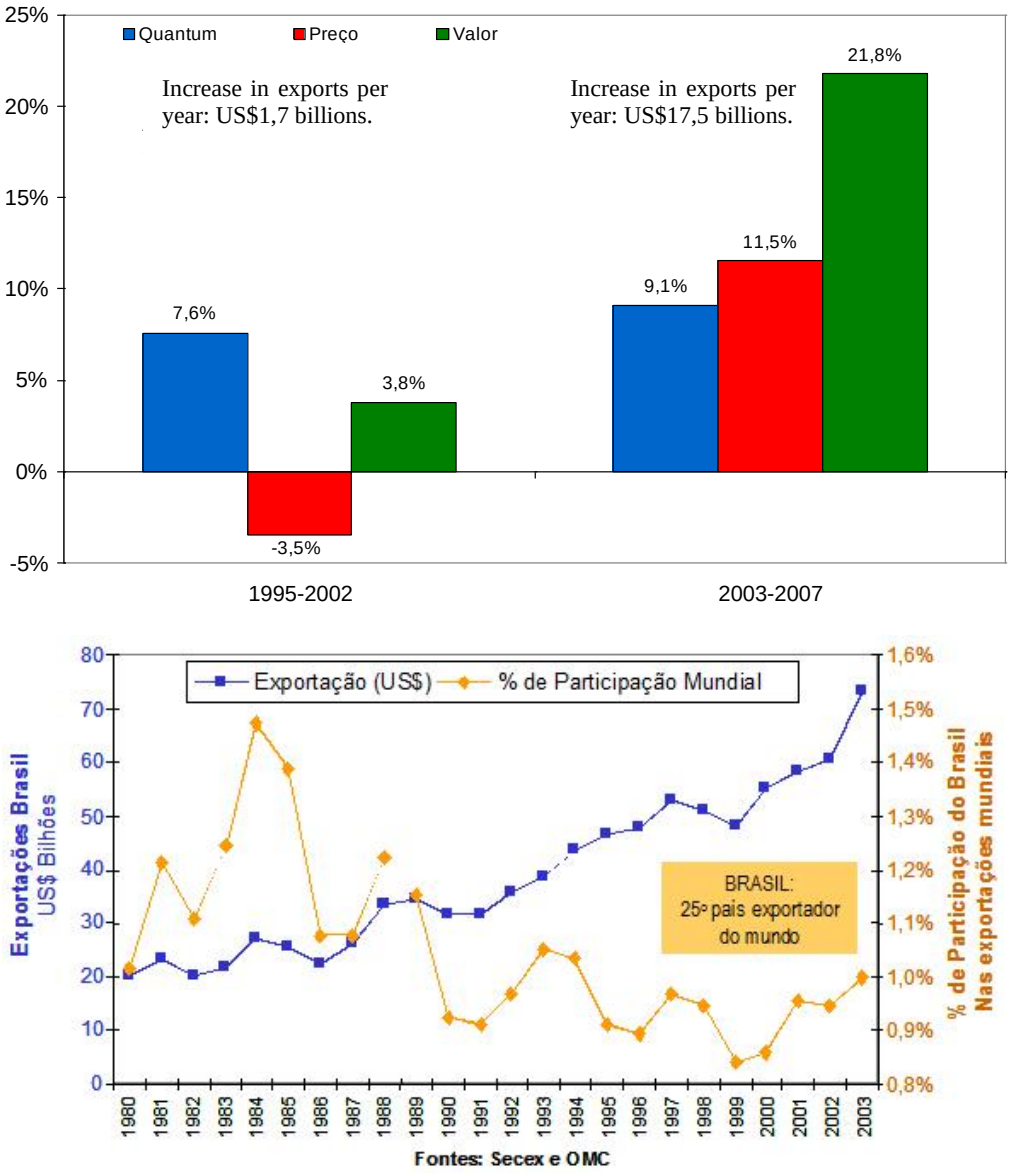


Fig. 3 - Growth rate in exports from Brazil

It can be seen an increase at the quantity of exports (blue column at first graph) and at the price and value of the products exported (red and green columns). However, there's a decrease on the % of participation of Brazilian products over world export rate (yellow line at graph 2), showing still, a lack of logistics and incentive by the government. [39]

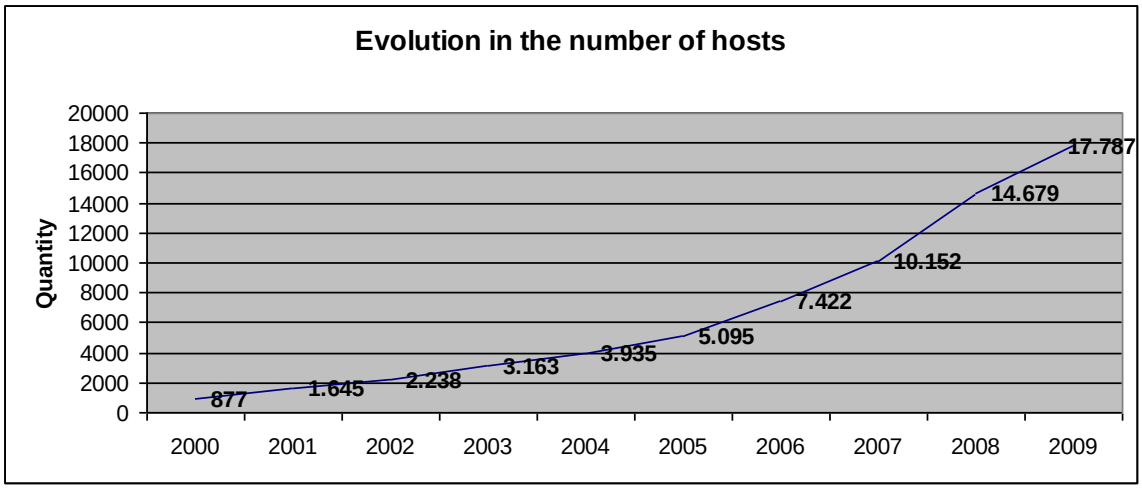
4.2 ICT segments have contributed very little to the exports

In 2008, Brazilian GDP reached R$ 2900 billion. Meanwhile, the export of ICT at the same year increased 75%, reaching the amount of R$ 2,3 billion, and still it didn't even represent 0.1% of GDP. [1]

3.5 Conclusions

With US$ 140 billion in 2009, the ICT sector grew from 6% to 8%, above the economic average growth (3,3% in the period of 2000-2009) . This represents around 7% or 8% of Brazil's GDP. [40]

Telecommunications, in particular, amount for US$ 75 billion of said total. According to the Institute of Applied Economic Research (Ipea), investments should reach R$ 67 billion in the next 4 years with most of this amount applied to expansion of 3G mobile network and broadband. This projection only considers the private sector, not considering the R$ 13 billion that the federal government will spend until 2014 with the implementation of the National Broadband Plan (PNBL) and does not include other resources disbursed by the State in that area, such as the digital inclusion programs. This shows that this particular sector is growing a lot faster than others and has a tendency to continue on the same path, given how much room there is to expand in the Brazilian Telecom sector. [9]



Number of hosts in Brazil from 2000 to 2008

All the growth trends displayed indicate that there is a large space both for investments in the development of web services as in the infrastructure for ICT.

Other trends in the coming years may include an increase in exports, especially considering that this is one of the national ICT policy's main foci, and Brazil is still underdeveloped in this respect: while India exported US$ 50 billion in the same sector, Brazil only had a corresponding US$ 3 billion. [41]

The current policy (PDP) intends to build the confidence in the ability to grow and to promote long-term competitiveness of the Brazilian economy. Thinking this way, four challenges should be addressed. To amplify the effects of competitive and positive distributional current expansion cycle in the long term, is also vital to make room for new players, broadening the conditions of market access for micro and small enterprises (SMEs). To implement and supervise the ICT

national policy, the instruments were separated into two discernible structures. The ABDI, which is responsible for development of ICT industries, is a lone agency, although there is plenty of communication between the two structures. The second one, composed of various entities, has a center in the Ministry of Science and Technology (MCT).

While trying to increase exports is a strategic objective of the current policy, it creates a weakness, since Brazil does not have a history of being highly competitive in the international markets where ICT is concerned. This historical failure can also be considered a threat to the policy.Despite these problems, Brazil has a favorable macroeconomic environment, and the government has recently invested in infrastructure and plans to continue on that path, which can be a great opportunity for the success of this policy.

4 COLOMBIA

4.1 ICT sector overview

The ICT sector in Colombia is going through a consolidation process in terms of market and regulation. The ICT sector has been consolidating for the last years, and there is not much historical information related to this industry. For this reason, an important part of the information presented here does not relate to ICT as a global industry, but specifically to the Telecommunications sector. Additionally, the analysis will show indicators about Science and Technology.

Regarding the weight of the Telecommunication services in GDP, its evolution has been positive, it has increased mainly due to the opening of international trade since 1990s and to the shift that Colombian economic performance has experienced, becoming a service based economy.

The leading sectors in the economy such as wholesale distribution, air transportation and financial services, among others, have incorporated intensively ICT in their activities, reflecting a greater weight of this sector in GDP. For example in 2006, the service sector (including commerce, repair services, transportation, telecommunications, financial services, real estate services, education, health, leisure, and public administration) contributed approximately 56% to the GDP.

4.1.1 Key indicators

		2000	2003	2006	2009
1.	Country population	40.282.217	41.847.421	43.405.387	44.977.758
2.	GDP per capita	2.335	2.462	2.809	2.997
3.	Weight of ICT in GDP	N/A	N/A	N/A	N/A
4.	% national budget dedicated to ICT	N/A	N/A	N/A	N/A
5.	Mobile subscribers in total / per 100 inhabitants	5.3	14.9	68.6	91.4
6.	Internet subscribers in total /per 100 inhabitants	N/A	1.9	2.0	7.0
7.	Broadband subscribers in total / per 100 inhabitants	N/A	0.2	1.4	4.9
8.	Internet penetration in total / per 100 inhabitants	N/A	5.1	15.9	44.0
9.	% of businesses with 10 or more employees using the Internet	N/A	N/A	Industry 49.4% Commerce 30.0%	N/A

		2000	2003	2006	2009
				Services19.9%	
10.	Share of ICT-related occupations in the total economy in selected countries	N/A	N/A	N/A	N/A
11.	Telecommunication services revenue in total	3.62	3.07	6.05	N/A
12.	Mobile telecommunication services revenue in total	528	1.04	1.60	3.93
13.	Telecommunication infrastructure investment in total	1.47	1.28	2.20	N/A
14.	Gross Domestic Expenditure on R&D – GERD	419.67	392.52	767.94	868.81
15.	ICT-related patents as a percentage of national total	N/A	N/A	N/A	N/A
16.	Technology Balance of Payments (TBP)				
17.	Technology balance of payments: Receipts (million current euros)	171.37	169.50	360.79	430.65
18.	Technology balance of payments: Payments (million current euros)	156.04	203.72	429.40	515.74
19.	Total number of ICT companies	N/A	N/A	N/A	N/A

** N/A it means Not Available*

** See explanations of each item of the table in Annex II*

4.1.2 Institutional structure

In Colombia, as already mentioned, the ICT sector is undergoing a process of consolidation and there is not a unique diagram that shows the relations between different government entities responsible for ICT. However, all these organizations report directly to the President, except the National Television Commission –CNTV- which is an autonomous organism which reports to Congress.

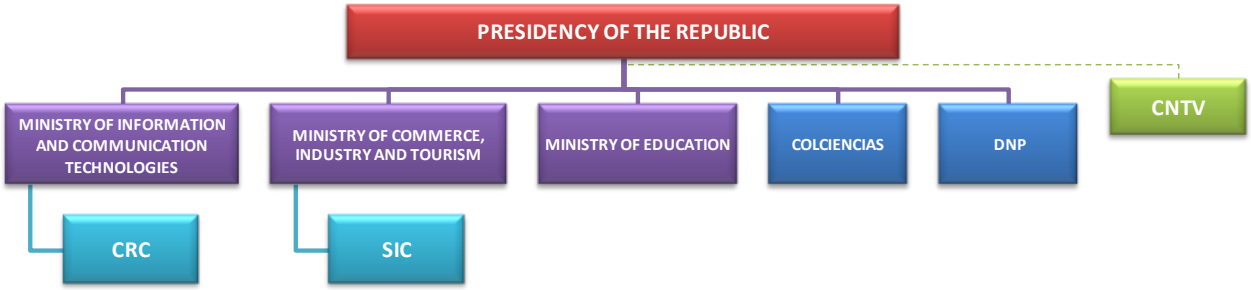


Fig. 4 - Structure of government entities responsible for ICT

Each organization has its own sub-structure shown in ANNEX II, under the heading "Structure of government entities responsible for ICT".

Although there are several entities linked to the ICT sector in Colombia, only two of them are in charge of designing and implementing research policies in ICT: the Ministry of Information and Communication Technologies and the Administrative Department of Science, Technology and Innovation –COLCIENCIAS-. The Ministry of ICT defines and promotes sector policy to ensure ICT access and use by communities, businesses and government, as well as efficient spectrum development and management by industry.

COLCIENCIAS promotes public policies to foster science, technology and innovation in Colombia, focusing on knowledge production for the integral development of the country.

The Superintendency of Industry and Commerce –SIC- administers the National Industrial Property System and advises the National Government on policy design related industrial property, consumer protection and competition in the sector.

4.2 ICT national policies

4.2.1 Evolution and current status of National ICT policies

Although there have been several initiatives, programs and guidelines[5], which have taken into account the use and incorporation of ICT in different areas (e-government, e-business, e-learning, e-health, e-employment, e-environment, e-agriculture and e-science), it is only through the transition process from telecommunications to ICT, as a consequence of market behavior and convergence, that Colombian government began to design tools focused on ICT as a whole.

One of those policies is the National ICT Plan, created in 2008 by the Ministry of Information and Communication Technologies, as the national strategy for the use of ICT, which aims to advance digital inclusion and social equity, and also increase productivity and competitiveness, resulting in social development and higher welfare of the population.

[5] e.g. Vision Colombia 2019 National Plan of Scientific, Technological and Innovation Development 2007 -2019 (PNDCT+I), Law 1286 of 2009 (Science and Technology Law) and CONPES document 3582 of 2009 (National Policy on Science and Technology), among others; developed government institutions like the Ministry of Information and Communication Technologies, the National Planning Department (DNP), The National Council of Economic and Social Policy (CONPES) and COLCIENCIAS.

The main goal of the ICT Plan specifically related to research is:

- Strengthening capabilities on ICT research, development and innovation, in order to support the development of skilled human resources and new technologies to improve competitiveness and welfare.

In addition, the National ICT Plan (PNTIC) put forward a set of policies, actions and projects through programs in four vertical axes to achieve better appropriation and use of ICT in priority sectors, dealing with subjects and strategies affecting different sectors and groups: (1) Community, (2) Legal and normative framework, (3) Research, Development and Innovation, and (4) E-government.

On the other hand, Law 1341 of 2009 defined the principles and concepts on the Information Society and the organization of the Information and Communications Technology -ICT sector. It created the National Spectrum Agency and defined the objectives of the Ministry of Information and Communication Technologies.

Priorities established by Law 1341 focus on research, promotion and development of ICT as a State policy integrating all economic sectors, levels of public administration and society, in order to forward educational, cultural, economic, social and political development, and increase productivity, competitiveness, respect for human rights and social inclusion. The most recent policy in Colombia related to the ICT sector is VIVE DIGITAL Plan which was launched by the new Government Administration[6] in October 2010, during ANDICOM 2010, the international ICT Congress organized by CINTEL. However, the final version of this document is being modified to take into account contributions made by citizens through the website of this Plan (http://vivedigital.gov.co).

The main objective of the VIVE DIGITAL Plan is *"to promote mass use of the Internet to achieve a leap forward in Democratic Prosperity"*. In order to attain this goal, the Plan will create a digital ecosystem which has four dimensions: infrastructure, services, applications and users, considering supply and demand (Fig. 5). The interaction of these dimensions seeks to generate growth of the ICT sector.

[6] It is worth mentioning that the Colombian Administration changed in August 2010; the current President of the Republic is Mr. Juan Manuel Santos Calderon.

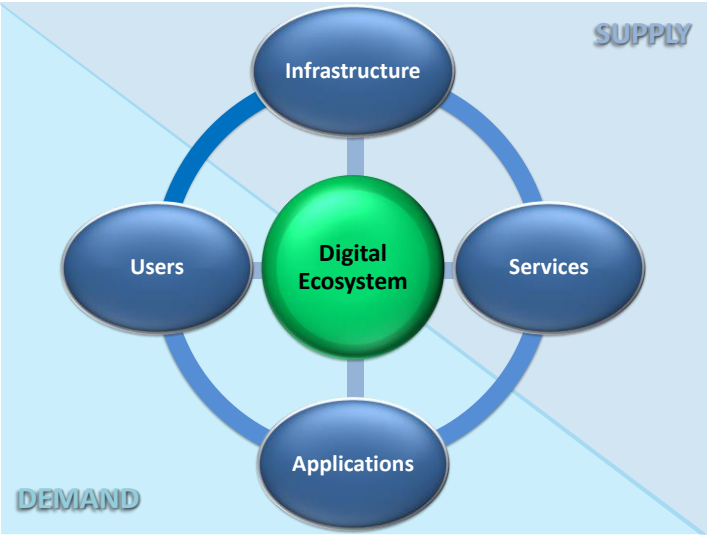


Fig. 5- Digital Ecosystem of the VIVE DIGITAL Plan

The Government looks to solutions in technology appropriation and content-development by users through:

- Tecnocenters
- Capacity building training programmes
- New regulation framework to ensure service quality and user protection

Regarding capacity building, the Ministry of Education, the National Learning Service -SENA- and COLCIENCIAS, supported by the Ministry of ICT, will carry out different training programs and develop infrastructure for innovation in the ICT sector:

- Integrated plan for technology in education
- Human talent promotion programs will be conducted by SENA
- COLCIENCIAS will support innovative projects and training of professionals:
  - Creation of 3 R&D&I centers in the sector, in order to promote research and technology transfer to enterprises
  - "Bicentennial Generation" Scholarship Program: 375 doctoral student scholarships in ICT by 2014.
  - Funding ICT use and infrastructure projects in academy, industry and special research centers. Five projects are to be related to productive transformation
  - Platform of science, technology and innovation which will offer information and applications of National R&D&I System.

Furthermore, because ICT are interconnected with all sectors and industries in Colombia, the Plan intends for the Ministry of ICT to work with all other Ministries, defining strategies, projects and programs in order to meet the objectives of the Plan.

Through ICT policies, goals, programs and priorities, the national government continues to make efforts to coordinate development of this sector and to provide Colombian people with universal

and free access to the Information Society.

The final draft of the VIVE DIGITAL Plan is expected to include a program focusing specifically on ICT research.

4.2.2 Instruments associated to the ICT policies and managing organizations

The previous Government Administration developed different ICT projects in fields such as social communication, education, health, justice and competitiveness in the business sector, in four policy axes:

- All Colombians connected and informed
- Consolidation and modernization of institutions among strategic sectors
- Development and competitiveness of the ICT industry
- A sustainable policy of public television and radio with a positive impact for Colombia

Some of the most important programs of the Ministry of ICT, within the policy axis "All Colombians connected and informed" are:

> *Compartel:* The aim of this program is to secure and democratize telecommunications services, especially in low-income sectors and in remote regions of the country. Compartel has developed five lines of work: Rural Community Telephony, Telecenters, Broadband connectivity for public institutions, Extension and replacement of Public Switching Telephone Networks – PSTN networks and Expansion of broadband networks with emphasis on the SMEs. For year 2010, the budget assigned is approximately 9.17 million of dollars.
>
> *Computers for Education (Computadores para Educar - CPE):* This program was launched in 2000, with the objective of facilitating ICT access to public educational institutions through reconditioning, assembly and maintenance of computer equipment, in order to promote proper use and development of this educational support strategy.
>
> CPE involves different community and economic sectors to foster corporate social responsibility, increase the skills of technicians, promote learning and create practical technical environment for engineering students, promote alternative educational processes, prevent negative environmental impacts and encourage innovation. For 2010, the budget assigned to this program is approximately US$35.64 M.
>
> *E-Goverment (Gobierno en Línea):* The objective of this Program is to build a more effective, transparent and participatory government that provides better services to citizens and businesses by taking advantage of ICT. This strategy is developed through two major components: Online Government Services and Government Intranet. The national government has assigned a budget of US$ 9.24 M for this program.

On the other hand, new ICT is currently integrating inputs, suggestions and needs of the sector in order to design the instruments associated with the VIVE DIGITAL Plan, to reach its objectives considering the digital ecosystem.

4.2.3 Important policy documents

The table below shows a list of the main recent ICT policy documents in Colombia related to research in this area:

Document name *(original and English)*	**Reference year**	**Short description**	**Coordinating entity**
Decreto 2610 de 2010 / Decree 2610 of 2010	2010	This Decree regulates National STI Councils, which are referred to in Article 7 of the Law 1286 of 2009 on Science, Technology and Innovation.	COLCIENCIAS
Ley 1341 de 2009 / Law 1341 of 2009	2009	This Law is the ICT development Framework which defines the principles and concepts of the Information Society and the organization of Information and Communication Technologies -ICT sector-, establishing the National Spectrum Agency.	Ministry of Information and Communication Technologies
Ley 1286 de 2009 Ciencia y Tecnología / Law 1286 of 2009 Science and Technology	2009	The objective of this law is to strengthen the National System of Science and Technology and COLCIENCIAS to achieve a sustainable production model of Science, Technology and Innovation in order to add value to products and services in the Colombian economy and promote productive development and an innovative national industry.	Congress of the Republic
CONPES[7] 3582 Política Nacional de Ciencia, Tecnología e Innovación National Policy of Science, Technology and Innovation	2009	This document is a national policy designed to increase government capacity and thereby generate knowledge-based economic and social development. This policy establishes funding and/or coordinated implementation of activities in Science, Technology and Innovation by actors in the National System of Science, Technology and Innovation (SNCTeI).	COLCIENCIAS DNP
Plan Nacional de Desarrollo 2006 – 2010 National Development Plan 2006 – 2010	2006	This document is the Government Plan that defines the guidelines necessary for the country´s development.	Presidency of the Republic
2019 Visión Colombia II Centenario / Colombia Vision 2019	2006	This document sets ambitious goals for peace, social justice, infrastructure, quality of life, productivity, competitiveness, consolidation of multiparty democracy and democratic liberties.	DNP

[7]CONPES, the National Council of Economic and Social Policy, is the highest national planning agency that serves as advisor to the Government in all aspects of economic and social development of the country. Its members are the President of the Republic, the Vice-president, all the Ministers, DNP and COLCIENCIAS.

Document name *(original and English)*	**Reference year**	**Short description**	**Coordinating entity**
Plan Estratégico Programa Nacional de Electrónica, Telecomunicaciones e Informática 2005- 2015 / National Strategic Plan of Electronics, Telecommunications and Informatics 2005 – 2015	2005	This document analyses new technological and market trends, convergence and impacts, to outline the country´s opportunities to achieve competitiveness.	COLCIENCIAS

Table 2- List of the main recent ICT policy documents in Colombia

4.3 Main stakeholders in the ICT field

According to the information collected, and despite the fact that in Colombia the ICT sector is not consolidated yet, there are various institutions working in this field (see ANNEX II) like associations, companies, funding agencies, higher education institutions and research organizations, among others. But not many of these institutions are specifically related to the ICT research area.

Associations

There are 17 ICT associations identified in this document, located mainly in the capital of the country, Bogota. One of the most representatives is FEDESOFT, the Colombian Federation of Industry Software and Information Technologies, which started operations in November 1999 with the mission of strengthening the sector through standardized policies and the defense and promotion of the software industry´s interests in Colombia. This association is the most representative professional body within the IT sector, which represents this sector´s interests before public and private institutions, on national and international scenarios. FEDESOFT promotes industry growth through a global strategy that addresses businesses, academy and government.

Companies

Regarding ICT sector companies, this document tried to classify a sample of companies according to the following criteria: IT components (25), IT equipment (11), Telecom Services (41) and Computer Services and Software (23). Telecom services companies are located in different cities because in general each city has one of them. Though, most services are provided on a countrywide scale. Some of them, mainly the telecommunications operators have an R&D&I department.

Funding agencies

Regarding funding agencies for the ICT sector, the project identified 10 of them, which not only fund ICT projects or initiatives, but also topics related to Science, Technology and Innovation in Research and Development.

The most important funding agency in Colombia is COLCIENCIAS, the Administrative Department of Science, Technology and Innovation, which fosters the creation and strengthening of Science, Technology and Innovation through financial and administrative tools. COLCIENCIAS finances projects for the social appropriation of Science, Technology and Innovation; patents creation in Colombia; projects of innovation and business development; research internships in companies, technology development centers or training centers; and the creation of research excellence centers.

Higher education institutions

In Colombia, according to SNIES (National System of High Education) a system of the Ministry of Education, there are 52 universities (public and private) that offer careers related with ICT such as Electronic Engineering, Electrical Engineering and Systems Engineering, through campus and/or distance education programs. 32 universities with engineering faculties were chosen for this study; 17 faculties are classified by the Ministry of Education as high quality accredited institutions.

Among these 17 universities, one public institution, the Universidad Nacional de Colombia, has national education coverage in 8 regions of the country: Amazonia, Caribe, Bogotá, Manizales, Medellín, Orinoquia, Palmira and Tumaco. However, the undergraduate and post-graduated programs related with ICT are located only in some campuses:

Campus	Undergraduate programs	Postgraduate programs	PhDs
Bogotá	Electrical Engineering Electronic Engineering Systems Engineering	Master in Systems Engineering and Informatics Master in Electrical Engineering Master in Telecommunications Engineering	Electrical Engineering Mechanical and Mechatronic Engineering Systems Engineering and Informatics
Manizales	Electrical Engineering Electronic Engineering	Specialization in Network Management and Data	N/A
Medellín	Electrical Engineering Systems Engineering and Informatics	Specialization in Systems Master in Systems Engineering	Systems Engineering

Table 3 - List of ICT-related programs in the Universidad Nacional de Colombia

Within private institutions, the Pontificia Universidad Javeriana which belongs to the Society of Jesus (Jesuits) was the first university in Colombia to be awarded with the Institutional Accreditation by the CNA (National Accreditation Council, a body attached to the CESU - National Council of Higher Education- which promotes and implements the accreditation policy to achieve quality standards in higher education institutions). It has two campuses, one in Bogota and another one in Cali. The following table shows the programs related with ICT.

Campus	Undergraduate programs	Postgraduateprograms	PhDs
Bogotá	Electronic Engineering Systems Engineering	Specialization in Software Enterprise Architecture Master in Systems Engineering and Informatics Master in Electronic Engineering	Engineering
Cali	Electronic Engineering Systems Engineering and Informatics	Master in Engineering	

Table 4 - List of ICT related programs in the Pontificia Universidad Javeriana.

Research organizations (public and private)

Even though Colombia is not a technology developer, it is a country with huge potential for research, development and innovation, with research organizations both public and private endeavouring to foster and develop ICT projects and initiatives, and to implement solutions to answer the needs of research in different sectors of the country.

The main institutions considered have carried out research related in some way or another to ICT issues.

The most representative research promotion organization in Colombia is COLCIENCIAS, the Administrative Department of Science, Technology and Innovation, which is the agency in charge of defining R&D&I policies, strategies, plans and programs in order to create the necessary conditions for scientific and technological development, providing also funding for ICT Research.

Among the 4239 research groups registered in COLCIENCIAS, 398 groups focus on Electronics, Telecommunications and Informatics dealing mainly with systems design, studies and application of technologies in health and education.

On the subject of ICT research, the Telecommunications Research Center of Colombia – CINTEL, a private non-profit corporation, studies and promotes the full use of ICT through four lines of action: Research and Innovation, Technical Assistance, Training and Information Services. Its board is chaired by the Minister of ICT of Colombia and has a large number of members, including telecommunications operators, universities, government agencies and technology providers.

Due to its experience in the development of the sector, CINTEL is now positioned as one of the most suitable agencies for the development of ICT projects in Latin America.

4.4 SWOT analysis of national ICT policies

The following SWOT analysis was built as part of the 112th session of the National Council of Electronics, Telecommunications and Informatics - COLCIENCIAS ETI, which is composed of nine members (three business representatives, three representatives from higher education institutions and three government representatives), with support by the Prospective Group of the Universidad del Valle and CINTEL.

Strengths:	***Weaknesses:***	***Opportunities:***	***Threats:***
1.1 Establishes regulations for the sector **1.2** Promotes and strengthens research through incentives **1.3** Allocates resources for research **1.4** Promotes use and development of ICT in different fields of industry and society. **1.5** Infrastructure and facilities. **1.6** Promotes social use of ICT	**2.1** ICT policy does not incorporate the electronics sector **2.2**There is no integration of the chain of value **2.3** Lack of coordination of actors **2.4** No integration between national policy and SMEs. **2.5** The policy does not promote the strengthening of SMEs based on technology and the internationalization of research (globalization is seen as a threat) **2.6** SMEs are not well organized and their efforts are not coordinated. There is a lack of investment in research. **2.7** The policies do not evaluate their results or impact **2.8** There is no dynamism in the private sector because the State is the main driving force in the industry. **2.9** Despite promotion	**3.1**Growth of cities **3.2** Definition of world class Sectors **3.3** National Science and Technology, Standards - CONPES, Law of Science and Technology, Caldas Fund **3.4** Offset Agreements **3.5** Law of Software **3.6** Higher education Centers **3.7** Technical capacity of operators **3.8** Better access to LATAM market **3.9** Free trade agreements signed and underway. **3.10** New resources for investment in R&D&I **3.11** Aggressive Doctoral promotion policies. **3.12** COLCIENCIAS' SNCTI Institutional strengthening **3.13** Governmental goal setting (Visión Colombia 2019)	**4.1** Globalization **4.2**Trade Agreements **4.3** Policies do not respond to changes such as: the speed of innovation and multinational operators, infrastructure development and technology transfer. **4.4** Lack of clarity and stability in the regulation. **4.5** No e-development policy **4.6** No focus on investment **4.7** Lack of clarity on tariffs and access to Internet networks

	of doctoral education, the industry still requires PhDs. **2.10** Lack of innovation in enterprises **2.11** There is no promotion for the absorption of trained human resources in industry **2.12** Absence of a policy for hiring highly qualified human resources. **2.13** Inadequate integration between university, business, and Government. **2.14** There is not much research from industrial sectors. **2.15** There is not much infrastructure for research. **2.16** Lack of funds for investment on research. **2.17** There is no roadmap for the development of research **2.18** Offsets		

4.5 Conclusions

During the last years, the ICT sector in Colombia is undergoing a consolidation process. For this reason the information available from different sources, both public and private, in general, does not account for ICT as a global industry but instead alludes to the Telecommunication sector.

Despite the difficult economic global situation during the last years, the Telecommunication sector in Colombia has had a positive behaviour in the period 2000-2009 in comparison with other economical sectors. This was achieved mainly through investment in infrastructure, which

was reflected on the growth of indicators such as total revenue, Internet and mobile subscriber penetration.

Total revenues for the Telecommunication services sector show a positive and dynamic behaviour, specifically from revenues generated by mobile phone and Internet services, which have lead industry growth, showing the highest rates compared to the other telecommunication services.

Mobile phone service is seen as the main generator of revenue for the sector, representing about 50%, for this reason it is considered as one of the most important, not only in terms of technological growth, but also in terms of diffusion and penetration.

On the other hand, regarding R&D&I, the results are also positive for the same period. For example, the Gross Domestic Expenditure on R&D in 2000 was U.S $419.670 M. while in 2009 was U.S $868.812 M. It shows the big research potential of the country. In addition, the Technology Balance of Payments in general in the period shows a surplus.

The current Government Administration is aware of the importance of the ICT sector and wants to incorporate it in all Ministries in order to achieve the objectives of the VIVE DIGITAL Plan, and the ICT policy. The Ministry of ICT is working on the final version of the Plan that will include citizen-input on these topics.

Although the present version of the VIVE DIGITAL Plan does not contemplate a specific section on ICT research, it is expected that the new version of this will include a research program.

In spite of the advancements in the ICT sector (such as the definition of a regulatory and policy framework, the promotion and strengthening of ICT research, the promotion of social use of ICT, and infrastructure in the country), it is necessary to work further to consolidate the industry, which still presents weaknesses such as lack of coordination among stakeholders, scarce integration between national policy and SMEs, lack of evaluation of policy results or impacts, poor hiring schemes for highly qualified human resources in industry, and the lack of a roadmap for research development.

Finally, it is important to note that the ICT sector also has major opportunities to consolidate with the growth of cities, definition of world class sectors, higher education centers in the country, better access to LatAm market, institutional strengthening and redefinition of COLCIENCIAS and the SNCTI[8], and the definition of Government goals through the document Vision Colombia 2019.

[8] National System of Science, Technology and Innovation.

5 CHILE

5.1 ICT sector overview

Chile in the last four years has presented an overall sustained increase in private investment in ICT. The only exception is the year 2009, which presents a reduction of 0.7% with respect to the previous year, mainly due to the reduced investment budgets and caution in front of the global crisis. However, It is expected that during 2010 investments in ICT could increase again to reach around € 2.283 million.

Also, since 2006 public investment in Science, Technology and Innovation in Chile has increased significantly mainly due to the new resources emerging from the mining royalty, earmarking an amount equivalent to more than € 557 million for research.

5.1.1 Key indicators

The following table contains the key indicators proposed to develop the analysis on national ICT policies. The data survey was carried out resorting to the most official sources of information obtaining, in some cases, straight data to fill in the template and, in other cases, databases with no relation with the proposed categories or simply inaccessible, this later lead us to classify many indicator boxes with N/D (no data available). A detailed explanation and analisys is included in annex III.

		2000	**2003**	**2006**	**2009**
1.	Country population	15.211.308 [1]	15.773.504 [1]	16.432.674 [1]	16.928.873 [2]
2.	GDP per capita (thousands of CLP)	2.667 [3]	3.213 [3]	4.706 [4]	4.9 [5]
3.	Weight of ICT in GDP	2.8 [6]	3.1 [6]	N/D	N/D
4.	% national budget dedicated to ICT	N/D	N/D	N/D	N/D
5.	Mobile subscribers in total / per 100 inhabitants	21.97 [7]	45,4 [7]	75,39 [7]	96,7 b [7]
6.	Internet subscribers in total / per 100 inhabitants	3,78 [8]	5.22 [8]	6.59 [8]	9.82 [8]
7.	Broadband subscribers in total / per 100 inhabitants	00.5 [9]	2.20 [9]	6.13 [9]	9.79 [9]
8.	Internet penetration in total / per 100 inhabitants	21.6 [10]	29.50 [10]	42.50 [10]	N/D
9.	% of businesses with 10 or more employees using the Internet	N/D	47.85% [11]	66% [11]	N/D

10.	Share of ICT-related occupations in the total economy in selected countries	N/D	N/D	N/D	N/D
11.	Telecommunication services revenue in total	N/D	N/D	N/D	N/D
12.	Mobile telecommunication services revenue in total	N/D	N/D	N/D	N/D
13.	Telecommunication infrastructure investment in total	N/D	N/D	N/D	N/D
14.	Gross Domestic Expenditure on R&D – GERD	N/D	0,67 [15]	N/D	N/D
15.	ICT-related patents as a percentage of national total	6.99% [17]	5.82% [17]	12.84% [17]	N/D
16.	Patents by sub-sector: •IT components	0.00%	0.00%	0.14% [17]	N/D
	•IT equipment	4.75% [17]	5.48% [17]	10.65% [17]	N/D
	•Telecom services	1.32% [17]	0.34% [17]	1.64% [17]	N/D
	•Computer services and software	0.92% [17]	0.00% [17]	0.41% [17]	N/D
17.	Technology Balance of Payments (TBP) (See comments below)	0.8 [18]	1.04 [18]	1.2 [18]	N/D
18.	Technology balance of payments: Receipts (million current euros)	N/D	N/D	N/D	N/D
19.	Technology balance of payments: Payments (million current euros)	N/D	N/D	N/D	N/D
20.	Total number of ICT companies	N/D	N/D	N/D	386 [16]
21.	Total number of ICT companies per sub-sector: •IT components	N/D	N/D	N/D	12 [16]
	•IT equipment	N/D	N/D	N/D	33 [16]
	•Telecom services	N/D	N/D	N/D	73 [16]
	•Computer services and software	N/D	N/D	N/D	265 [16]

** N/D means No Data available.*

** See explanations of each item of the table in Annex III*

5.1.2 Institutional structure

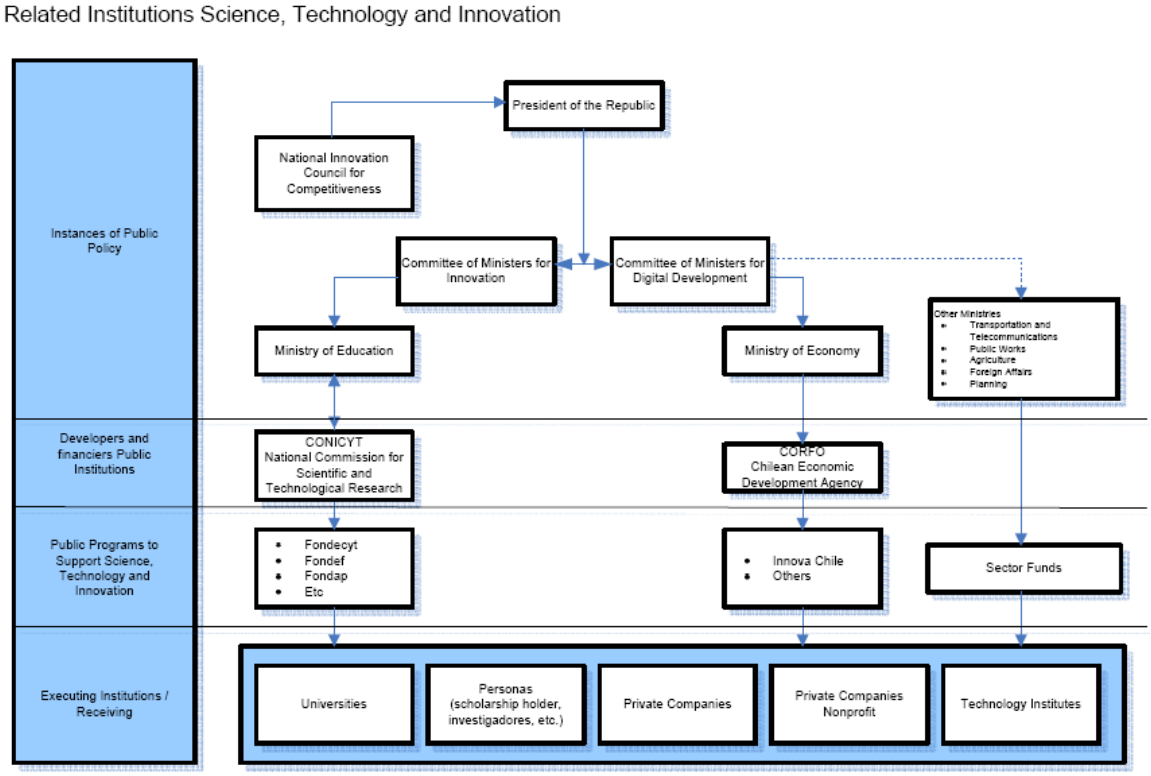


Fig. 6 - Diagram with the structure and relations of governmental organizations with competences in ICT

As shown in figure 5 above, the Chilean institutionality and relation of actors relevant to scientific-technological research, development and innovation (and consequently for ICTs) exhibits a very hierarchical structure where the definition of policies is centralized around the Presidency of the Republic only with the advise of ministerial committees (for innovation and for digital development) and one political-technical council of innovation for competitiveness. The administrative and financial responsibility of implementing such policies relies on two main institutions (one related to research and the other to commertial innovaton and competitiveness) whose general programs are complemented with more specific sectorial funds supported by some specific ministries.

From the operative point of view, this structure in general is quite unidirectional starting from the policies definition at top layers down to the executive level where the public/private research institutions or individual as final beneficiaries must adapt their initiatives accordingly with the priorities and models defined at the upper instances. In this context, though being of transversal relevance for any organism devoted to innovation or competitiveness, the definition of ICT

research, development and innovation priorities and policies is mainly concentrated in the Committee of Ministers for Digital Development, whose strategic definitions are operatively assumed by a permanent office at the Ministry of Economy (recently renamed as of Economy, Promotion and Tourism) currently named Executive Secretariat for Digital Development (its former name was Digital Strategy) where a CEO (currently Mr. Alfredo Barriga) has been designated by the President as the person in charge of coordinating the execution of the politics approved by the Committee.

It is, however, necessary to remark that the strategic boost given to ICTs by the Executive Secretariat for Digital Development is much more related to technological innovations and improvements of public services through the use of ICTs rather than to the financial support for ICT research to develop such innovations or improvements. In its turn, the research dimention itself, as suggested in the figure, is more straightly related to the National Commission of Scientific and Technological Research, CONICYT, dependant from the Ministry of Education. At this level, despite the technological role originally expected for CONICYT and the several funding instruments to support S&T R&D the ICTs nowadays do not have specific instances or programs since ICTs are considered just as a transversal tool to reach other scientific or technological goals. Thus, even from the point of view of the Chilean national institutionality and political structure, ICTs are not considered as a research object by itself while ICT based solutions are deemed as the strategic base for the national subsystem for innovation and competitiveness.

A more detailed description about the Instances of Public Policy and the Promoting Public Agencies and Funders included in the diagram of figure 5 is provided in annex III.

5.2 ICT national policies

5.2.1 Evolution and current status of National ICT policies

Chilean governments of the last decade had implemented two main national ICT public policies: the Digital Agenda 2004-2006 and the Digital Development Strategy 2007-2012. Both are focused on the national development through the access and use of ICTs respectively but cannot be considered as ICT "research" policies although they aim to reinforce technological innovation at different levels.

The Digital Agenda 2004-2006 was focused in reaching a massive access to ICT (mainly communication services and computational equipment), then for the Digital Development Strategy policy (2007-2012), the approach was focused on the impact and intensive use of ICTs for public services and platforms as well as for the industrial competitiveness.

In early 2003 the Chilean government established an Inter-ministerial Committee headed by the Minister of Economy wherein a CIO (Chief Information Officer) was appointed by the government to guide the development of the Digital Agenda. The CIO formed the Digital Action Group, which was constituted with private, public experts and academics. The Digital Agenda 2004-2006 had 34 proposals into six different areas: access, education and training, government online, digital business development, ICT industry and regulatory environment.

Then, in early 2007 the President Bachelet's administration finished the incorporation of the CIO figure and created a new institutional framework: the Committee of Ministers for Digital Development composed by the Ministers of Treasury, Education, General Secretariat of the Presidency, Transport and Telecommunications and Economy, who presides it. The Committee of Ministers have an Executive Secretariat originally called Digital Strategy, who is at the Ministry of Economy with a permanent team, in charge of the coordination and execution of the initiatives, strategies and policies designed and approved with the Committee of Ministers for this area.

The resulting policy, currently in execution, was called Digital Development Strategy 2007-2012 and has four strategic lines: Projects and Programs for Digital Development, Technological Policy for Digital Development, Development Strategy for the ICT Industry and Institutional Framework. These lines include the following specific actions: The renewal of the telecommunications regulatory framework, the impulse to the massive access to broadband, new phase of digital literacy campaign, use of ICT in the classroom, integrated digital government, development of creative and content industries by promoting the software industry.

Regarding the current policy, it is necessary to highlight that from March 11th, 2010 Chile has a new president, Mr. Sebastián Piñera, who (in front of the major priorities arisen after the 27th february earthquake) has not yet formalized the new policies that will be implemented in the field of innovation and digital development, therefore not reflected in Table 2.2. The main strategic lines of his government regarding ICTs, can be extracted from the State of Nation presidential speech (May 21, 2010) which was analized by the Executive Secretary of Digital Strategy (Government's ICT CEO, Mr. Alfredo Barriga) as part of the XXII Latin American Summit of Information Technology (June 02, 2010) which was organized by the FP7 FIRST project partner ALETI (Federation of Information Technology Associations of Latin America, Caribbean and Spain).

In this event, as a national authority, Mr. Barriga highlighted the willingness of Chilean government to support all public and private initiatives for digital technologies appropriation that could accelerate the full incorporation of Chile to the Knowledge Society in a global economy. With this in perspective, a series of actions oriented to the development of human capital were suggested and linked to the generation of jobs in the area of ICTs where the cluster of global services is very promising. Additionally, the idea of reaching free and universal access to the most dynamic sources of knowledge and culture, such as Internet and broadband access, were mentioned in this discourse as key points to help people expand their job opportunities. Barriga, pointed the three action axes for digital development in Chile 2010–2014: knowledge as the most important resource, competitiveness and the generation of content to enhance the economy and the perspective of a Knowledge Society. As a complement to this vision, the new Executive Secretary of Digital Strategy, also pointed out the following sentences mentioned at the presidential speech:

- Chile must be effectively incorporated to the Knowledge Society by 2018.
- ICTs are to the Knowledge society what factories where to the Industrial Society.
- Everybody should have a reasonable level of conditions to access broadband Internet.
- It is necessary and urgent to train right now the workforce for the upcoming knowledge-based economy and to pervade the whole society with a digital vision.
- Chile needs its students not only accessing to ICT resources and equipment but also need

them to have the sufficient know how to use them. Hence, arises the need of providing all schools with broadband access, electronic boards and multimedia equipment and to guarantee that every student has access to a computer or another device with web browsing capabilities, and have the competences for using such resources.

5.2.2 Instruments associated and managing organizations

In the figure 5 at section 6.1.2 CORFO and CONICYT appear as the two main agents that manage public resources to support research, development and innovation projects where ICT related initiatives could be granted. The lines and funding programs under their administration are, however, widely oriented to many areas of knowledge, with no specific calls to finance ICT research projects. Nevertheless, research, development and innovation proposals that incorporate the use of ICTs as a mean to pursue scientific or technological achievements can be submitted to many CORFO and CONICYT instruments. It is noteworthy that by 2010 these two entities have new directors appointed by the new President Piñera's administration. However, in its first annual period the new Government has not introduced relevant changes giving continuity to the national priorities and instruments. In this context, since 2006 the national budget has notably incremented the resources to R&D for innovation, through the incorporation of the FIC (Innovation Fund for Competitiveness) which has increased the public investment in innovation reaching in 2009 more than 102.000 millions of Chilean pesos which constituted around a 34% over the 300.000 millions of Chilean pesos of public investment in innovation that year. The FIC has been incremented by 18% from 2006 to 2007, 39% from 2007 to 2008 and 21% from 2008 to 2009.

Despite the lack of specific instruments for ICT, when focusing the possibilities of ICT research it is possible to consider different instruments identified under CORFO where, in particular, the CORFO Innova programme offers natural conditions for the application of new digital technologies as the base of industrial or commertial improvements. Also, under CONICYT we find several programmes where ICTs can be one of the axis for the proposals. Although ICTs can be included in many R&D initiatives to be submitted to CONICYT's programmes, the only instrument 100% oriented to finance ICT research is the TICEDU subprogram (development of ICT applications in Education) which is part of the general FONDEF program annual calls at CONICYT. These instruments have not undergone profound changes with respect to their strategic objectives, since, during the successive presidential periods from 2000 to 2010, the innovation and development has remained one the main basis for competitiveness and country development.

At the political level, the agents responsible for defining the guidelines and policies more related to ICT development are the Committee of Ministers for Innovation and the Committee of Ministers for Digital Development, which are advisers of the President and coordinate the actions through a Executive Secretariat. Then, at a more operative level, the responsibility of defnining funding lines and programs to execute the public budget relies mainly on CONICYT, CORFO and their respective programs.

5.2.3 Important policy documents

Document name ***(original and English)***	**Reference year**	**Short description**	**Coordinating entity**

Document name *(original and English)*	**Reference year**	**Short description**	**Coordinating entity**
Law Decree ratifying the National Innovation Council for Competitiveness (CNIC) [19]	2009	Formalizes the CNIC existence since 2005. It provides a summary of activities, goals and tasks of the Council 2008-2010.	Chilean Presidency
Presidential Instruction that formalizes Committee of Ministers for Innovation (CMI) [20]	2007	Creates the committee, defines its tasks and functions in the implementation of public policies on innovation.	Chilean Presidency
Presidential Instruction creates the Committee of Ministers for Digital Development [21]	2007	Creates the CMDD, defines its tasks and lines of action regarding ICTs.	Chilean Presidency
Digital Strategy 2007-2012 [22]	2007	Sets the objectives and goals for the digital strategy in Chile 2007-2012: • Increase the competitiveness of enterprises through the intensive use of ICT. • Create and foster a new culture in ICT • Promote the development of a quality digital government • Increase the intensity of ICT use by students and civil society.	Committee of Ministers for Digital Development.
Digital Action Plan 2008 – 2010 [23]	2008	Defines a set of initiatives and projects that will be implemented to achieve the objectives defined by the Digital Strategy for 2008-2010 in six main lines of action: • Increased Connectivity and Access • E-Government • Adoption of ICT in Business and Clusters • Education and Training • Strengthen Global Technology Services Industry (Offshoring) • Improve Environment Policies	Executive Secretary Digital Strategy
National Innovation Strategy - Volume I [24]	2007	Proposal for a national innovation strategy to adapt institutions and governance systems of the entire public system for supporting innovation.	National Innovation Council for Competitiveness
National Innovation Strategy - Volume II [25]	2008	Coordination guidelines to accomplish the innovation tasks in a timely and harmonic manner to maximize potential benefits of private sector towards Chile development.	National Innovation Council for Competitivenes
National Innovation Policy for	2009	Actions and priorities implemented during the Government of President Bachelet.	Ministerio de

Document name *(original and English)*	**Reference year**	**Short description**	**Coordinating entity**
Competitiveness. Guidelines and Action Plan 2009-2010 [26]		It considers the promotion of human capital, development of research capabilities, entrepreneurship, innovation and technology transfer.	Economía
Innovation and Competitiveness Agenda 2010-2020 [27]	2010	Defines political priorities to promote business innovation and product diversification. Science, technology and human capital are set as critical factors.	National Innovation Council for Competitivenes

Table 5 - Important policy documents of Chile

5.3 Main stakeholders of the ICT field

The main stakeholders of the ICT field in Chile have been grouped into: ICT associations, Companies of the ICT sector, Funding agencies, Higher education institutions, Research organizations (public and private), Entities participating in R&D projects, and other reference institutions. The complete lists for these items including names and URLs are presented in ANNEX III.

ICT associations

1	Asociación Chilena de Empresas de Tecnologías de Información (ACTI)	www.acti.cl
2	Gremio de Empresas Chilenas Desarrolladoras de Software (GECHS)	www.gechs.cl

These are the most important ICT industrial associations in Chile. ACTI (The Chilean Association of Information Technology Companies), founded in 1984 currently has over 151 national and international members, with a turnover of about $ 2.7 billion. GECHS (The Chilean Association of Information Technology Companies), founded in 2002, brings together about 70 national SMEs in the areas of Software Products, Software Engineering, IT Personnel Outsourcing, IT Consulting and Process Consulting.

Companies of the ICT sector organized by subsector

IT Components

1	Intronica S.A.	www.intronica.com	1
2	Kersting S.A.	www.kersting.cl	1
3	Victronics Ltda.	www.victronics.cl	1

IT equipment

1	Alcatel Lucent	www.alcatel-lucent.com
2	Cisco Chile	www.cisco.com/cl

3	Dell Computer de Chile Ltda.	www.dell.cl
4	FSC Chile S.A. / Fujitsu-Siemens Computers	www.fsc-chile.cl
5	Hewlett Packard Chile Comercial Ltda.	www.hp.com
6	IBM de Chile S.A.C.	www.ibm.com/cl
7	NEC Chile S.A.	www.nec.cl
8	Ericsson Chile S.A.	www.ericsson.com/cl
9	Teknos S.A.	www.teknos.cl
10	Veto y Cia. Ltda.	www.veto.cl
11	Vigatec S.A.	www.vigatec.cl

The list for IT equipment subsector consider a selection of leading companies by market positioning, thus the vast majority of them are associated with an international company, all these companies have headquarters in the capital of Chile, Santiago.

Telecom services

1	Entel S.A.	www.entel.cl
2	Global Crossing (SAC Chile S.A.)	www.globalcrossing.com
3	Telefónica Empresas CTC Chile S.A.	www.tempresas.cl
4	VTR Globalcom S.A.	www.vtr.net

The list for Telecom services considers the four leading companies by market positioning and distribution of large customers.

Computer services and software

1	Adexus S.A.	www.adexus.com
2	Genera S.A.	www.genera.cl
3	Magenta Computación S.A.	www.magenta.cl
4	McAfee Chile S.A.	www.mcafee.com
5	Microsoft Chile	www.microsoft.com
6	NCR Chile Industrial Comercial Ltda.	www.ncr.com
7	Némesis Informática S.A.	www.nemesis.cl
8	Novared S.A.	www.novared.cl
9	Oracle Chile	www.oracle.com/cl
10	Panda Software Chile Ltda.	www.pandasoftware.cl
11	Sonda S.A.	www.sonda.com
12	Xerox de Chile S.A.	www.xerox.cl

Computer services and software sub-sector represents the 68.83% of the ICT companies. this list only consider 12 leading companies by market positioning.

Funding agencies

Innova Chile, Corporación de Fomento a la Producción	www.corfo.cl

(Corfo Innova)	
Comisión Nacional de Ciencia y Tecnología (Conicyt)	www.conicyt.cl

These main funding agencies concentrate most of the government budget for the development of Science, Technology and Innovation. Both operate and manage competitive grants related to ICT, among other areas of development and national research interest. CONICYT increased its budget by 169% between 2006 and 2009. Corfo Innova resources have grown by 49% between 2006 and 2009.

Higher education institutions

Pontificia Universidad Católica de Chile	www.puc.cl
Universidad de Chile	www.uchile.cl
Universidad Técnica Federico Santa María	www.utfsm.cl
Universidad de Concepción	www.udec.cl

This list consider four Universities (public and private) selected according to their major number of students, and research productivity (measured in terms of participation in national and international R&D projects and number of publications).

Research organizations (public and private)

Departamento de Ciencias de la Computación, Universidad de Chile	www.dcc.uchile.cl
Centro de Modelamiento Matemático	www.cmm.uchile.cl
Centro de óptica y Fotónica	www.cefop.cl

These three organizations have been selected considering the number of ICT results published. They belong to two universities from Santiago and Concepcion.

Entities participating in R&D projects

Entities participating in international R&D projects

Entities participating	**Web site**	Projects
UNIVERSIDAD DE CONCEPCION	www.udec.cl	9,38%
Conicyt	www.conicyt.cl	9,38%
PONTIFICIA UNIVERSIDAD CATOLICA DE CHILE	www.puc.cl	9.38%

The main entities involved are selected by number of international projects, these together account for 28.14% of total international projects registered (see annex III).

Entities participating in national/regional R&D projects

1	PONTIFICIA UNIVERSIDAD CATOLICA DE CHILE (PUC)	www.puc.cl	22,8%
2	UNIVERSIDAD DE CHILE (UCH)	www.uchile.cl	21,05%
3	UNIVERSIDAD TECNICA FEDERICO SANTA MARIA (UTFSM)	www.utfsm.cl	14,3%
4	UNIVERSIDAD DE CONCEPCION (UCO)	www.udec.cl	14,3%

These four institutions account for 72.45% of the projects being implemented at national level.

Other reference institutions

Centro para el Desarrollo de la Nanociencia y Nanotecnología	www.cedenna.cl
National Standardization Institute (INN)	www.inn.cl

INN (National Standardization Institute) has a Digital Consulting Center with a bank of Chilean standards, more than 180 000 foreign and international standards and publications on management systems quality. CEDENNA is focused on knowledge generation and promotion of technological innovation based on Nanoscience. It involves three universities, Universidad de Chile, Universidad de Santiago de Chile and the University Federico Santa Maria, together with companies and central government entities.

5.4 SWOT analysis of national ICT policies

Strengths:	***Weaknesses:***	***Opportunities:***	***Threats:***
1.1 High Internet penetration rate and ICT consumption 1.2 Good conditions for international trade 1.3 Existence of at least two official programs of public funds for ICT 1.4 Existence of institutional and	2.1 Dispersion and lack of coordination in ICT development actions 2.2 Failures in the systematization of information on ICT 2.3 Shortage of specific funding for applied research in ICT in the public	3.1 Integration of Chile to the OECD 3.2 Establishment of Free Trade 3.3 Integration of Chile in international networks of R&D and innovation 3.5 National stimulus plan for R&D and innovation	4.1 Lack of real priority of the ICT theme in the government programs of recent decades 4.2 The continuity of the processes of R&D and innovation has a high dependence on government periods 4.3 Generational gaps

political basis for the development of ICT 1.5 Existence and progressive development of a National Innovation System 1.6 ICTs are formally recognized in the National Innovation Policy for Competitiveness as a cross supporting area for the top five productive clusters.	agencies related to R+D+I 2.4 Lack of incentive to corporate-university partnering in ICT applied research 2.5 Low participation of ICT area in national funding programs 2.6 Low participation of the ICT area in financing programs for Advanced Human Capital Formation	3.6 International trend of the institutional structural change on Science and Technology	and differences in both the state and private sector in the manage the use of ICTs 4.4. Poor perception of Chile as technology producer

1.- ***Strengths***

1.1 *High Internet penetration rate and ICT consumption:* Chile exhibits one of the highest Internet broadband penetration rates in Latin America with a 9.7% over 100 inhabitants [1] with around 31% of households accessing Internet through fixed broadband technology. The relative size and sustained growth of the market for mobile telecom and Internet subscribers in Chile allows cost-effective ICT services and makes Chile, as in many other fields, a healthy test market for ICT innovations.

1.2 *Good conditions for international trade:* Chile is an attractive country for foreign investment due to its economic stability and safety conditions. This is reflected by the several Free Trade Agreements that Chile has signed with several countries around the world.

1.3 *Existence of at least two official programs of public funds for ICT:* The FDT (Telecommunications Development Fund), managed by SUBTEL, corresponds to a public competitive fund that subsidizes the installation and expansion of commercial telecom networks for areas with low concentration of consumers. The ICTs for Effective Education program (TIC EDU) managed by CONICYT aims to help improving the Chilean Educational records and the development of ICT industry for education.

1.4 *Existence of institutional and political basis for the development of ICT:* By 2010, Chile has already established a relatively advanced institutional structure. From the "Digital Agenda 2004-2006" Chile evolved into what is nowadays the "Digital Strategy 2007-2012", which is currently considered as the main, and probably the only, public policy on ICTs in the country.

1.5 *Existence and progressive development of a National Innovation System:* Chile has progressively strengthen its national innovation system and strategies for competitiveness by implementing financial instruments to promote innovation and entrepreneurship. Funds are offered towards the industry and the citizenship through the economic development agency CORFO while the National Committee for Innovation and Competitiveness (CNIC) advises the Presidency in the formulation of policies. These agencies recognize explicitly on their agendas and strategies the ICTs as a development priority.

1.6 *ICTs are formally recognized in the National Innovation Policy for Competitiveness as a*

cross supporting area for the top five productive clusters: The Ministry of Economy's report "National Innovation Policy for Competitiveness. Guidelines 2009-2010" declares that "four transversal areas, that have been identified as enabling conditions for innovation, will be strengthened, namely: biotechnology, water resources and environment, information and communication technologies (ICT) and non-conventional renewable energy , biofuels and energy efficiency". [37]

2.- ***Weaknesses:***

2.1 *Dispersion and lack of coordination in ICT development actions:* In Chile, many isolated actions are carried out in public and private areas for ICT development. There is not a single national ICT policy (with category of law) supported by a strong institutional structure in order to ensure its coordination and enforcement. Thus, we find uncoordinated expenditures on ICTs at various public bodies perhaps motivated by circumstances that lead the entities to incorporate subjectively ICTs in their duties in order to qualify for the indicators of quality used for their assessmentand certification.

2.2 *Failures in the systematization of information on ICT:* Monitoring of R+D+i in the ICT sector in Chile is difficulted by information gaps, duplications, and certain degree of disconnection between the various government agencies. Many of the available information systems used to access statistics, publications, etc. are not opportunely updated and have been implemented as simple technological upgrades over the same old systems and databases thus inheriting their structural and systemic deficiencies. Much of the information somehow pertaining to ICTs is not classified in relation to its technological profile, so it is very difficult to selectively access the data to establish an analysis focused on this aspect which is precisely the center of many FORESTA tasks (See anexx III).

2.3 *Shortage of specific funding for applied research in ICT in the public agencies related to R+D+I:* In most of the national funding programs there are no resources specifically allocated for ICT research. In CONICYT, by 2008 among 11 funding programs no one were specific to ICTs. Similarly, CORFO, among its 21 lines of financing, only offers one specific credit line in ICT that brings access to long term soft loans for those interested in pursuing Undergraduate Careers on ICT.

2.4 *Lack of incentive to corporate-university partnering in ICT applied research:* There are no specific instruments to promote and stimulate the ICT R&D between Universities and companies. The lack of interest from companies in doing so is especially noticeable in the case of public universities, because they have administrative and regulatory barriers which make them less competitive to provide technology transfer services to the industry.

2.5 *Low participation of ICT area in national funding programs:* National reports on R&D investment figures show that, despite the high visibility and priority given and declared for ICTs in the national political discourse, this area finally has a lower than tertiary place when the concrete investment and expenditures figures are observed (see annex III).

2.6 *Low participation of the ICT area in financing programs for Advanced Human Capital Formation:* The same inconsistence between the discursive priority of the ICTs for the country development and the concrete figures of financial support assigned to them can be observed with regard to the national investment in advanced human resources for R&D (see annex III).

3.- *Opportunities:*

3.1 *Integration of Chile to the OECD:* Chile has been officially integrated in January 2010 at the Organization for Economic Cooperation and Development. This not only opens the door to

cooperation that the country may be subjected by the more advanced members of the group, but that to Chile also imposes a series of development standards (including ICT) that Chile must satisfy.

3.2 *Establishment of Free Trade Agreements:* Chile has signed Free Trade Agreements (FTAs) with 51 countries, nine countries in the Asia Pacific, the main destination of our exports.

3.3 *Integration of Chile in international networks of R&D and innovation:* International Projects like FORESTA generate relationships among key stakeholders for promoting R&D. For example, "Innova Chile" has executed a program for "Attraction of R&D Centre of International Excellence." to carry out R&D activities with cutting edge technology and with a high sectorial impact.

3.5 *National stimulus plan for R&D and innovation:* Chile has a tax incentive for private investment in R&D which is an instrument established by Law 20,241. Taxpayers are entitled to a tax credit in the exercises associated with payments under contracts for R&D agreements.

3.6 *International trend of the institutional structural change on Science and Technology:* The tendency of some countries to create a high-level institutions on the topic of science and technology (eg Brazil since 1985) reinforces the opportunity to evolve into a local Digital Strategy with greater autonomy, power and resources (Undersecretariat, Ministry) .

4.- ***Threats:***

4.1 *Lack of real priority of the ICT theme in the government programs of recent decades:* Chile has an institutional structure for ICT that requires an specific and autonomous budget, in addition to the influence and political authority necessary to carry out a plan and policy of development in ICT. Chile currently exhibits a lag compared to other countries which have strengthened their ICT related institutionality (eg Brazil, which created the Ministry of Technology).

4.2 *The continuity of the processes of R&D and innovation has a high dependence on government periods:* The periods and changes in central government in Chile generate a discontinuity in the process of digital development. The redesign of policies each presidential term (4 years) affects the continuity of some projects. This results in a lack of long-term vision and commitment to the continuity of processes and strategies for R&D and innovation in different departments of government.

4.3 *Generational gaps and differences in both the state and private sector in the manage the use of ICTs:* The difference between the rapid pace of growth, ubiquity and appropriation in the use of ICT by young generations, versus the slow literacy and appropriation of ICTs in the older generation, produce generational gaps, that can impact not only in the domestic interaction of people with their environments, but also among those responsible for designing policies and national strategies and responsibles of operative work in R&D and innovation (see anexx III).

4.4. *Poor perception of Chile as technology producer:* The ICT in Chile have not been defined as a productive cluster but only as a transversal priority for clusters. This produce that ICT would be taken only as a useful input to other production processes or simply an expense associated with the modernization. Thence, Chile have a risk to keep its technological unbalance that characterizes it as a consumer and not as a technology producer, which can add an additional barrier to a Chilean ICT products that could be exported to foreign markets.

5.5 Conclusions

Chile has a relatively advanced institutional and regulatory framework related to ICTs which has evolved during the last decade generating the two main general public policies that have oriented the national digital development and has set the conditions to support and carry out research, development and innovation in this field. Regarding the ICT related institutionality, for the policy definitions the Presidency of the Republic receives advisory from different bodies where it is remarkable the role of the Committee of Ministers for Digital Development and its Executive Secretariat (ICT CEO) which coordinates and define the actions needed to follow the official priorities to promote the acces of Chile to the society of knowledge by taking advantage of the ICTs as a key instrument.

Despite the high relevance given to ICTs at all levels, the economical and political priorities of the national system are focused on the development through the innovation and competitiveness thus leading to a national strategy and a institutional/regulatory structure where ICTs are key for the national development but mainly seen as a transversal tool for the innovation and competitiveness rather than a scientific or technical research focus by itself. Thus, on one hand, the research promotion system (represented by its main public agency CONICYT) is still oriented to support basic scientific research (where ICTs are instruments) while the innovation promotion system (represented by its main public agency CORFO) is oriented to finance the development of value-added comertial products and services (were ICTs are a component). Hence, only few funding instruments in Chile are specifically devoted to R&D in ICT. Nevertheless, the direct public resources input devoted to R+D+i, incremented by the FIC (Innovation Fund for Competitiveness) set an interesting opportunity for the researchers to take good advantage of the the scientific, social and comertial potentialities of the ICTs.

After gathering the information that we found available, some general trends for Chile concerning ICTs can be argumented as follows:

i. In the next years in Chile, government institutions, public services, etc. will tend to virtualize as much as possible most procedures and interaction with citizens, creating integrated platforms and standardizing the existing ones to promote the access through Internet for companies, organizations, institutions, etc. who require information or need to carry out any of the processes that nowadays still require to be done in person. Any transaction or proceeding feasible to be implemented at the distance will surely deserve a public and private effort for its implementation through the web.

ii. If economic conditions remain stable and people's consumption capacity remains evolving positively, Chilean consumers will increase the online shopping and e-commerce relations, making all their payments, transfers and high percentage of their shopping online. This will expand and produce great dynamism in the development of applications for different ICT based platforms.

iii. "Off shoring" industry will grow as new business trend. Global services offer will become one of the most extended market trends in the next years since the Chilean local market gets saturated very quickly. Additionally, the opportunity to offer services towards foreign economies is getting demystified and closer to entrepreneurs thanks to the increasing possibility of accessing the web.

iv. Collaborative and interactive work between universities and private industry could experience a strong impulse as a national development driver. This require the parts to set common areas of interest.

v. If under the current political change the country and its main institutions exhibit

stability, independence and continuity of the development process, there will be confidence at all levels so as to set long term ICT policies and other projections for the development of the country in strategic programs oriented beyond the four years horizon, which is the length of presidential periods.

vi. The ICT and digital development policies have been somehow formalized and established into the Chilean government system. However, it is necessary to make the national institutions become more autonomous by letting them manage more resources in proportion to the deployment of technological dimension in Chile. For instance, the main public division related to ICTs do not have a permanent nor effective politic dialog with the advisor entity in charge of steer presidential strategies. Concretely, there is a weak relation between SUBTEL and the Executive Secretariat of Digital Development.

vii. The creation of "Digital Strategy" in Chile, as the main national technologic development body responsible for advising the central government in implementing a strategic plan for technological development is seen as the main national ICT policy in Chile. However, it can be considered that ICT policy in Chile has been formulated as a strategic plan to foster specific areas rather than a set of laws oriented to regulate, promote, facilitate and finance the Chilean technologic development as a whole.

Finally, as a result of the analysis, it has been possible to point out five strategic objectives or priorities that could orient the generation of research initiatives or public policies for the ICT field (see more details in the annex III):

-Improvements in education by using ICTs.
-Decentralization and diversification of ICT infrastructure.
-Massification of access to ICTs.
- Improvement of institutional and regulatory framework related to R+D+I.
- Promotion of Innovation to improve the ICT consumer/producer balance of Chile.

6 ARGENTINA

6.1 ICT sector overview

The software and IT services industry in Argentina combines the presence of multinational firms and an increasingly dense and active network of small and medium enterprises (SMEs). More than 1,500 firms, accounting for 51,000 jobs (62% of them qualified), shape a growingly competitive market.

Argentina is endowed with several technological hubs and IT clusters operating in many cities along the country. In this locations, leading multinational firms, domestic SMEs and universities work hand in hand achieving synergies and increasing competitiveness. Buenos Aires currently concentrates 49% of total firms. In particular, the "Polo IT Buenos Aires" comprises more than 80 domestic SMEs, 46% of which export to 15 different countries. The cluster "Córdoba Technology" agglutinates 100 firms. One of the pillars of Córdoba's economic activity is the dense presence of universities

Argentina has an extensive telecommunications network and high-speed connectivity in continuous expansion. The country benefits from advanced and competitive telecommunications in a deregulated market. Large capital investments have resulted in digital networks with national and international connectivity. Fixed-line and mobile density (105 subscribers per 100 inhabitants) is the highest in Latin America and Internet penetration is increasing rapidly, well above the region's average

6.1.1 Key indicators

	2001	**2003**	**2006**	**2009**	**Sources**
1. Country population	37156195	37869730	38970611	40134425	[1]
2. GDP per capita	$ 7.231	$ 3.413	$ 5.463	$ 7.660	[1]
3. Weight of ICT in GDP	5,4%	3,6%	4,9%	5,6%	[2] & [3]
Weight in GDP of the following sub-sectors*:					
• Hardware	0,4%	0,3%	0,7%	0,8%	[2] & [3]
• Software	0,3%	0,3%	0,3%	0,3%	[2] & [3]
• Services	0,6%	0,5%	0,5%	0,6%	[2] & [3]
• Consumables	0,1%	0,1%	0,1%	0,2%	[2] & [3]
• Telecom	4,0%	2,4%	3,3%	3,7%	[2] & [3]
4. % national budget dedicated to ICT	N/A	N/A	N/A	N/A	
5. Mobile subscribers in total / per 100 inhabitants	18,1	20,7	82,0	125,6	[1] & [3]
6. Internet subscribers in total / per 100 inhabitants	3,6	4,2	7,2	10,7	[1] & [3]
7. Broadband subscribers in total / per 100 inhabitants	0,3	0,6	4,1	9,7	[1] & [3]

	2001	2003	2006	2009	Sources
8. Internet penetration in total / per 100 inhabitants	9,8	15,1	33,4	57,3	[1] & [3]
9. % of businesses with 10 or more employees using the Internet	N/A	N/A	N/A	N/A	
10. Share of ICT-related occupations in the total economy in selected countries	N/A	N/A	N/A	N/A	
11. Telecommunication services revenue in total	N/A	N/A	N/A	N/A	
12. Mobile telecommunication services revenue in total	N/A	N/A	N/A	N/A	
13. Telecommunication infrastructure investment in total	N/A	N/A	N/A	N/A	
14. Total R&D expenditure	N/A	N/A	0.5	N/A	
15. ICT-related patents as a percentage of national total	N/A	N/A	N/A	N/A	
19. Total number of ICT companies	N/A	N/A	N/A	N/A	

Sources are indicated in REFERENCES Chapter (page 259)

Due to the economic crisis that took place at the end of 2001, there was an important slowdown of general economic figures in the following years. Lately, the situation turned over a strong recovery which led to present figures similar to those found in the pre-crisis moments. Nevertheless, the mobile, Internet and broadband subscribers figures were not affected by that crisis and are constantly growing.

Unfortunately, some of the information required in the previous table is not available for us to include it in this report. Neither international organizations like the World Bank and the Ibero-American and Inter-American Network on Science and Technology Indicators nor national organizations like the Science, Technology and Productive Innovation Ministry, have such detailed information regarding the specific ICT field

6.1.2 Institutional structure

The most important governmental organizations with competence in ICT are the Ministry of Science, Technology and Productive Innovation (http://www.mincyt.gov.ar/) and the National Office for Information Technologies (http://www.sgp.gov.ar/contenidos/onti/onti.html) depending from the Public Management Secretary.

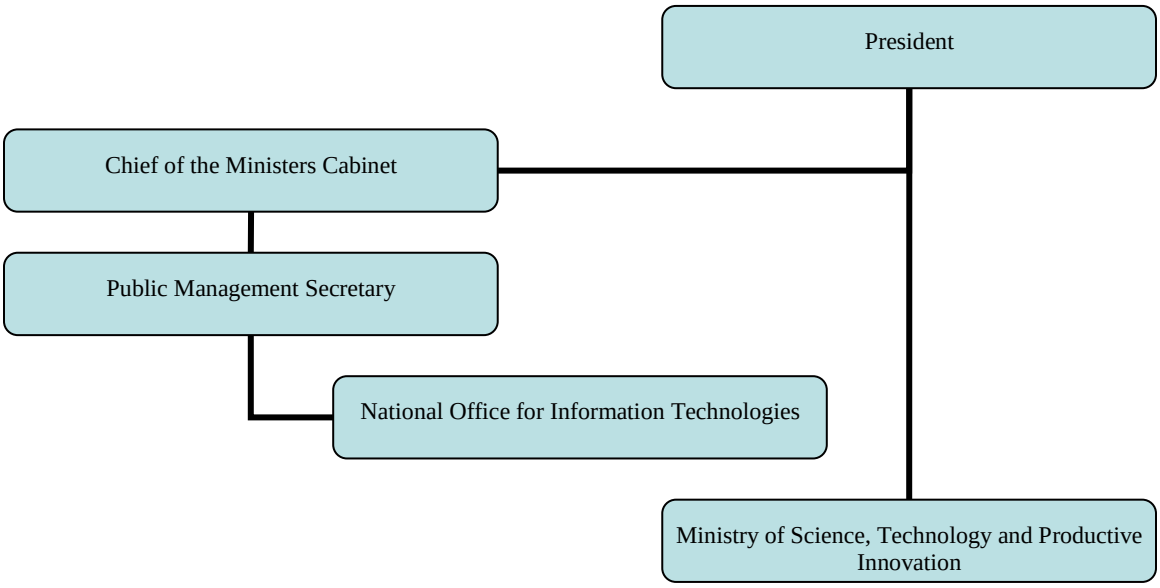


Fig. 7 - Diagram with institutional structure in Argetina

The Ministry is in charge for the whole Science and Technology agenda for Argentina including the activity related with ICT. The National Office previously mentioned is in charge of several ICTs related projects:

- National E-Government Plan
- Technological Standards for Public Administration
- Digital signature
- Tele-informatics Networks Emergency Coordination
- Systems Development for Public Administration
- Argentine Government General Portal

6.2 ICT national policies

6.2.1 Evolution and current status of National ICT policies

Some years ago, more specifically in 1998, the "argentin@internet.todos" program was established by the Presidential Decree # 1018/98 . That Decree was lately modified by two new Presidential Decrees # 252/00 and 243/01 and formally renamed as "Programa Nacional para la Sociedad de la Información" (National Program for the Information Society) depending upon the National Communications Secretary.

Even though this program is formally "alive", there are practically no activities in execution since some time ago. Therefore, at the present there is no formal ICT policy in Argentina. There are some instruments to promote this sector and an "E-Government Plan". Additionally, in Argentina, there is no uniform and global ICT policy for the whole public sector, like those in

practice in the EU.

The goals for the mentioned Program were:

- To advise the Government on policies of the IS as a national reference on the state of it.
- To provide advice and transfer of knowledge and expertise to governmental and non-governmental projects to promote access to Information Society and to cooperate in reducing the digital divide, particularly in sectors and groups excluded for economic, social, gender and/or disabled and others.
- To encourage the intensive use of ICT as enabling tools and articulating local development strategies.
- To generate successful experiences of ICT application to processes of social inclusion that are generalizable and self-sustaining.
- To promote the momentum of public and private actions to develop the training of specialized human resources in technology management to promote the Information Society and Knowledge.

6.2.2 Instruments associated and managing organizations

The instrument that describes the previously mentioned E-Government Plan is the Decree # 378/05. This Plan is under the responsibility of the National Office for Information Technologies

Even though it can't be referred as a National ICT Policy, it is important to mention the Software Promotion Law (Law N° 25.922)[9]. This Law has created a new set of fiscal incentives for firms that develop software. At the moment, almost 400 firms requested to become part of the promotional regime. Additionally, the Promotion Law set up FONSOFT, a public program intended to finance research, training and exports. At the same time, awards intended for professionals and institutions that make contributions to the country's IT industry were established.

Furthermore, responding to the increasing demand for highly qualified human resources, as of 2006 several programs were put in place aiming to attract young students into IT careers. In this last stage, the government and the universities continue to work hand in hand to increase the number of IT graduates at all levels, under the framework of the "National Plan for the Support of IT Teaching Activities". In the following lines we will outline some initiatives included in this Plan:

- InverTI en Vos: By disseminating information about the IT sector, this initiative encourages young argentines to engage in IT programs in universities across the country and therefore increase the supply of qualified labor in IT activities.
- Generación IT: A public-private initiative that attempts to draw students into university programs linked to the computer sciences and the IT sector in general by educating young students on the diversity of IT programs available.
- Program 500 X 500: A scholarship that consists of a monthly stipend for the best 500 high-school students in the province of Córdoba that pursue IT careers at the university level.

[9] http://infoleg.mecon.gov.ar/infolegInternet/anexos/95000-99999/98433/norma.htm

- Scholarships for university degrees: Launched in mid-2008, consists in a joint initiative of the Ministries of Education and Science, Technology and Innovation to promote the enrollment in university careers related to informatics and software. The plan contemplates granting increasing scholarships (up to US$ 4,000 a year) to 6,700 students enrolled in National Universities. This monetary benefit is for a maximum of 5 years and will be complemented with access to the scientific and technological system via research internships and teaching positions.

6.2.3 Important policy documents

Document name *(original and English)*	**Reference year**	**Short description**	**Coordinating entity**
National Program for the Information Society	1998	The main goal of this Plan was to facilitate the access of the Argentinean inhabitants into the IS	National Communications Secretary
National E-Government Plan (Plan Nacional de Gobierno Electrónico)	2005	This Plan include several actions in order to improve citizens' participation through digital means	National Office for Information Technologies

6.3 Main stakeholders of the ICT field

The main stakeholders of the ICT field in Argentina have been divided in the following groups: ICT associations, Companies of the ICT sector, Funding agencies, Higher education institutions, Research organizations (public and private), Entities participating in R&D projects, and other reference institutions. The complete list with names and URL is presented in ANNEX IV.

ICT associations

Software & IT Services Chamber of Commerce (CESSI ArgenTIna): It represents the companies devoted to developing, producing, marketing and implementing software and a broad spectrum of related services in Argentina.

Informatics & Communications Chamber of Commerce (CICOMRA): It is a private non-profit telecoms and IT association with the mission of working on behalf of the ICT sector, promoting sector growth, encouraging corporate development among members, and seeking the country's social and economic well-being.

Argentina Internet Services Industry Association (CABASE): Founded in 1989, CABASE is the association which has a membership of Internet Service Providers, Telecommunications, Datacenter Solutions and Online Content Companies, amongst others. In the international environment.

Civil Association for the Development of Information Society (LINKS): It's the first Argentine Civil Association specialized in the study and advance of Information Society, in its social,

ethical, and economic aspects.

Companies of the ICT sector organized by subsector

Telecom services: The most important Telecom companies in Argentina are listed in the Annex IV. While most of them are the local branches of international companies, there are some entirely funded by local investors.

Computer services and software: This is a very active sector in the argentine economy and there are a lot of big, medium and small companies. It is absolutely impossible to list all of them (probably a thousand or more), but we will list in the Annex IV the most important national companies in this sector

IT equipment: Most of the local IT equipment companies are vendors from international companies. There are only a few companies funded by local investors and they are mostly devoted to assembling imported parts. The most important companies in this sector are listed in the Annex IV

IT components: While most of these companies are vendors from international companies, there is an increasing number of them that are producing national IT components. It is important to mention Novatech. We will list in the Annex IV the most important companies in this sector

Funding agencies

Ministry of Science, Technology and Productive Innovation (MINCYT): This 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 MINCYT has published two documents regarding R&D medium and long term planning: the Bicentennial Strategic Plan for Science, Technology, and Innovation 2006-2010[10] (PROTIS), and "Basis for a Mid-Term Strategic plan in Science, Technology and innovation"[11]. 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.

Higher education institutions

Argentina's educational system offers 243 IT degrees, of which 117 are at the technical or junior college level and the other 126 are at the engineering level. With almost 70,000 students enrolled at university in informatics, the number of new enrollments every year is slightly over 15,000 (5% of total new enrollments). The number of IT students has been growing steadily since the early 1990s. Currently, the government is implementing a set of programs to keep up with the surging demand for qualified labor in the sector.

Research organizations

There are no specific research organizations for the IT sector. All the research is being done by Universities.

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http://www.agencia.gov.ar/convocatorias/documentosconvocatorias/plan_estrategico_bicentenario_vp_10jul.pdf

11 http://www.mincyt.gov.ar/bases_plan_estrategico_05_15/intro_bases_plan_estrategico.htm

The main R&D national organizations are:

The **National Council of Scientific and Technological Research (CONICET).** It is an autarchic governmental entity, under the jurisdiction of the Ministry of Science, Technology and Productive Innovation. The CONICET is the main entity devoted to the promotion and performance of science and technology in Argentina. Its activity is performed in five great areas of knowledge and in the major area of technology:

- Agricultural Sciences, Engineering and Materials[12]
- Biological and Health Sciences
- Exact and Natural Sciences
- Social and Humanitarian Sciences
- Technology

The **National Agency for the Promotion of Science and Technology (ANPCyT).** It is intended to strengthen public-private linkages and coordinate S&T programs by centralizing decision-making. It administers three funds:

- FONCYT
- FONTAR
- FONSOFT

6.4 SWOT analysis of national ICT policies

Strengths:	***Weaknesses:***	***Opportunities:***	***Threats:***
1. A huge number of higher education institutions devoted to ICTs 2. The education offered by those institutions is very good 3. Almost 50 years training ICTs human resources 4. Openness to the world 5. Strong participation in the Internet business, especially	1. The lack of ICT policies 2. The lack of a good statistical information system about the ICT sector 3. The lack of coordination between actions of various public organizations 4. The lack of coordination between actions of public organizations and private	1. Good exchange rate 2. Linkage with ICT professionals living outside our country 3. High cable (video), Internet and mobile telephony penetration rate 4. Fast growing ICT global market 5. Argentina is considered a qualified software producer 6. Digital TV service	1. Political instability 2. Legal uncertainty 3. Poor private investment 4. The number of ICT related graduates is less than the number required by the industry

[12] The IT area is included within this major area

in the Spanish speaking world 6. A fast growing ICT business sector	corporations 5. Communications infrastructure badly distributed through the country	launching	

A detailed description of these points may be found in Annex IV

6.5 Conclusions

The main trend in ICT sector is fundamentally oriented toward mobile telephony. This can be clearly understood having in mind that the number of mobile suscribers has raised dramatically during the last seven years, surpassing the number of inhabitants in the country

It is also important to mention the growth of the software development and IT services sectors. These sectors have been fostered especially due to two factors:

1) The good quality of professionals
2) The relative low cost of human resources (due to the favorable exchange rate between USD and Argentinean peso)

As it was previously mentioned, there are no ICT formal policies in Argentina. Even though it has been previously mentioned the National E-Government Plan and the Software Promotion Law that can be seen as useful tools aimed to foster the ICT sector.

Even though ICTs have been mentioned as a strategic priority for our country, by this moment it hasn't been established those priorities within that sector. Anyway, having in mind that there is a specific plan to foster the software sector (FONSOFT), we may conclude that this is a strategic priority for our country. The agent responsible for this instrument is the National Agency for Scientific and Technology promotion, depending upon the Science, Technology and Productive Innovation Ministry.

The main barrier to ICT expansion is the insufficient rate of growth of the number of IT careers students compared with the expansion of this sector.

Our visions of the key success factors for national ICT development are:

- Defining the strategic priorities in the ICT sector and a strong and very clear national ICT policy in line with those priorities.
- Assigning budget according to the previously mentioned priorities.
- Improving the almost good human resources level and the quantity of students in ICT careers.
- Fostering the integration of our economy, especially in the ICT sector, in the global markets.

7 MEXICO

7.1 ICT sector overview

The Networked Readiness Index (NRI)[13] and the Digital Opportunity Index ICT Development Index (IDI) (2002 and 2007)[14] placed Mexico below the world countries' average and indicated a reversal as compared to previous years[15]. Accordingly, the Mexican Government declared national ICT development a priority issue. Three main development points were named: 1) development of the software industry, 2) development of the digital supply chain and 3) e-Government. (Applications development). ICT research in Mexico is mainly conducted in public and private universities, as well as public research centers. CONACYT is the lead national funding agency[16]. The total number of national patents is 14.436, of which 10% are in the IT area. In the engineering area, there are about 1,775 members of SNI[17], of whom about 15% are researchers corresponding to the area of ICT.

7.1.1 Key indicators

	2000	**2003**	**2006**	**2009**
1. Country population 1/	98,438,557	101,999,555	104,874,282	107,550,697
2. GDP per capita (US $) 2/	5934.77	6874.07	9027.18	5,459.06
3. Weight of ICT in GDP 3/	4.02%	5.07%	5.63%	5.35% e/
Weight in GDP of the following sub-sectors: *3/				
• IT components	na	0.39%	0.32%	0.27%
• IT equipment	na	0.52%	0.43%	0.36% e/
• Telecom and multimedia equipment	na	na	na	na
• Telecom services	2.94%	4.16%	4.88%	4.72%
• Computer services and software	na	na	0.11% 4/	na
4. % national budget dedicated to ICT 5/	0.41%	0.43%	0.36%	0.45% p/
5. Mobile subscribers in total / per 100 inhabitants 6/	14%	30%	53%	71% 7/
6. Internet subscribers in total / per 100 inhabitants 6/	5.2%	15%	20%	22% 7/

[13] NRI takes into account the environment in the country for ICT development, preparation of relevant actors (government, industrial sector, academia) and the use of ICT by these actors. .Available on line at http://www.networkedreadiness.com/gitr/main/fullreport/index.html

[14] Implemented by the International Telecommunications Union (ITU), which tracks the targets acquired at the *Information Society Summit*. It takes into account three categories: opportunity, infrastructure and utilization. .Available on line at http://www.itu.int/ITU-D/ict/publications/idi/2009/material/IDI2009_w5.pdf

[15] Mexico was in 60th place in the years 2008-2009, and ranked 58th in 2007-2008 for the above indicators respectively.

[16] Source; Consejo Nacional de Ciencia y Tecnología CONACYT. http://www.conacyt.mx/

[17] SNI (Spanish acronym for the National System of Researchers System)2006, a recognition awarded through peer review to the work of people dedicated to research in sciene and technology. There are 13,480 members nationwide.

7. Broadband subscribers in total / per 100 inhabitants [8/]	0.008%	0.245%	2.817%	8.407%
8. Internet penetration in total / per 100 inhabitants [8/]	5.1%	12.0%	16.5%	na
9. % of businesses with 10 or more employees using the Internet [8/]	10-49= 49.74%	50-249 = 88.8%	na	na
10. Share of ICT-related occupations in the total economy in selected countries	na	na	na	na
11. Telecommunication services revenue in total (millions of dollars) [9/]	14,389.34	17,061.13	36,862.52	334,08.33 e/
12. Mobile telecommunication services revenue in total (millions of dollars) [10/]	3511	6978	13,661	20,045 e/
13. Telecommunication infrastructure investment in total (dollars) [11/]	7,066.67	2,971.15	3,809.25	na[b]
14. Total R&D expenditure	na	na	na	na
15. ICT-related patents as a percentage of national total (Triadic Patent Families) [13/]	8	15	17	na
19. Total number of ICT companies (Institutes Nationals and scientific and technological) [14/]	252 [15/]	1286	2891	na
Total number of ICT companies per sub-sector: • IT components • IT equipment • Telecom and multimedia equipment • Telecom services • Computer services and software	na 205 [15/ y 16/]	na	na	na

** according to the classification of the Joint Research Centre / Institute for Prospective Technological Studies in report R&D business investment in the EU ICT sector*

e/ Forecast

na not available

1/Consejo Nacional de la Población, http://www.conapo.gob.mx

2/ Made with information of National Institute of Statistics, Geography and Informatics INEGI

3/ Estimated with information of National Accounts, National Institute of Statistics, Geography and Informatics INEGI

4/ Data corresponding to 2005.

5/ Conacyt, Gobierno Federal (2010) Informe de Labores 2009, http://www.siicyt.gob.mx/siicyt/cms/paginas/EstArtSistemCyT.jsp?pSel

6/ World Bank, http://www.worldbank.org

7/ Data corresponding to 2008

8/ OECD; http://www.oecd.org/document/54/0,3343,en_2649_34225_38690102_1_1_1_1,00.html

9/ Made with information of OECD (2009); Communications Outlook 2009

10/ OECD (2009); Communications Outlook 2009.

11/ Made with information of Secretaría de Comunicaciones y Transporte (2007); Programa Sectorial de Comunicaciones y Transportes 2007-2012; Diario Oficial de la Federación; México

12/ OECD (2008); Information Technology Outlook 2008.

13/ OECD (2008); Compendium of Patent Statistics 2008.

14/ Conacyt, (2008); Informe General del Estadística y ciencia y la tecnología

15/ Data corresponding to 2001

16/ Mochi, Pruencio y Hualde, Alfredo; México, Producción interna e integración mundial, Cap. 6, Cepal

7.1.2 Institutional structure

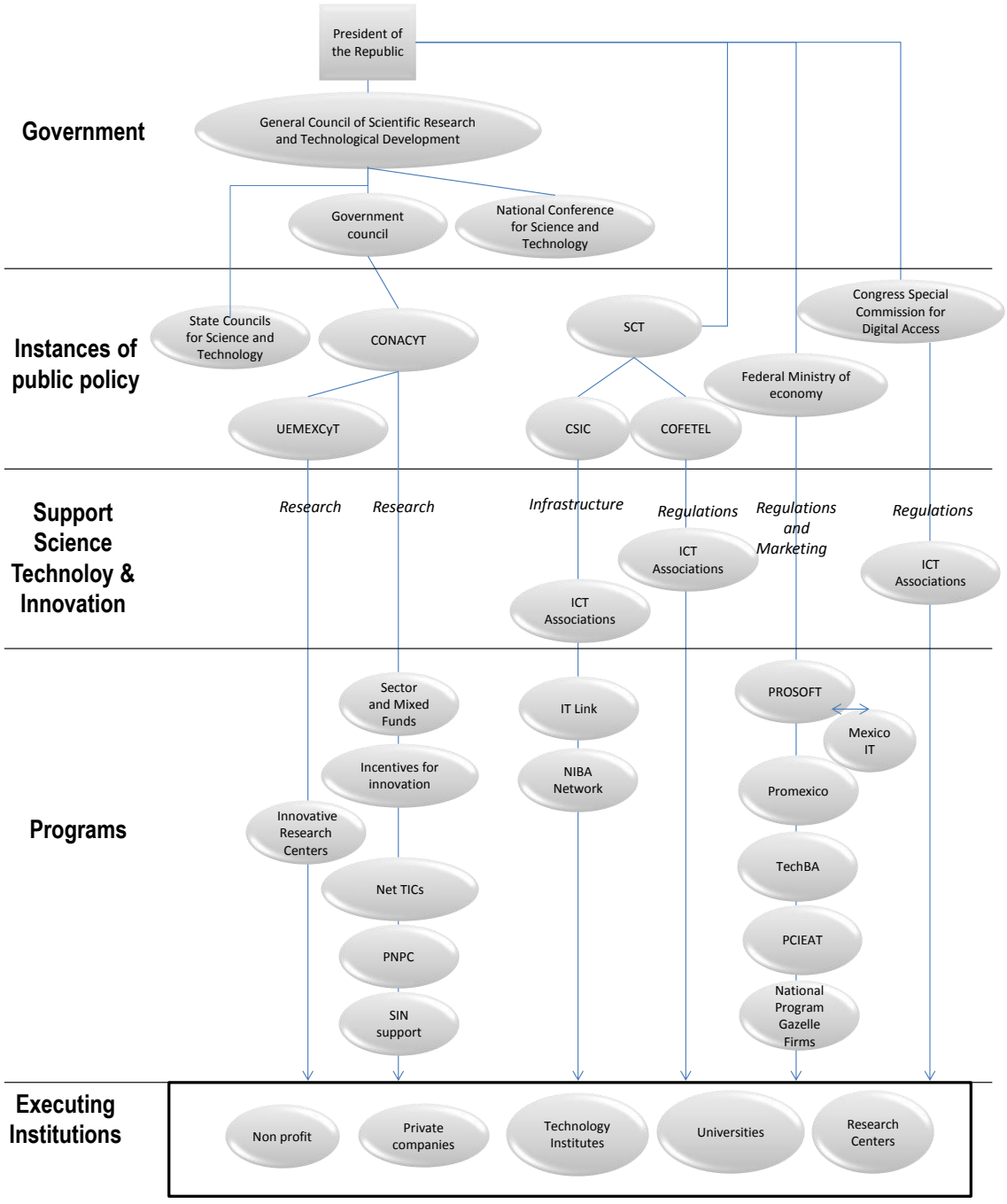

Fig. 8- Institutional structure in Mexico

Government -Policy Makers:

- "Consejo General de Investigación Científica y Desarrollo Tecnológico", the General Council of Scientific Research and Technological Development is a political organization with coordination functions which is also in charge of regulating the support of the

Federal Government to impulse, fortify and develop the national scientific and technological research. This General Council is integrated by:

- The President of the Mexican Republic,
- The 9 ministers of state,
- The General Director of the Conacyt,
- The coordinator of the Scientific and Technologic Consultative Forum
- 4 members invited by the President of the Mexican Republic, who act as persons.

- Congress Special Commission for Digital Access is a commission of recent creation, February 2010, in the Chamber of Representatives, "Cámara de Diputados". All parties have representatives in this commission. The topics and themes to be addressed in the work plan of this commission conform the legislative agenda to be impulse by this commission.
- Commission for Science and Technology- Chamber of Senate and of the Chamber of Deputies, are commissions with representatives of all mayor parties (PRD, PAN and PRI). These commissions have the mission to impulse the legislation in topics related to Science, Research and Innovation and Intellectual Property Legislation in Mexico. On the other side they are also in charge of revising the federal budget and procedures to establish the programs associated to Science and Technology.

Institutions of Public Administration:

- "Secretaría de Economía" , Federal Ministry of Economy: The Federal Ministry of Economy promotes the generation of quality employment and the economical growth of the country through fostering and implementing public policies which detonate the competitiveness and the investments in the production sector.
- "Secretaría de Comunicaciones y Transportes (SCT)", Federal Ministry for Communications and Transport: the Ministry for Communications and Transport promotes safe, efficient and competitive transportation and communications services by legal means, the definition of public policies, and the design of strategies that allow sustainable growth of the economy and social development of Mexico. In this Ministry, the Coordination for the Information and Knowledge Society (CSIC), dedicated to foster the access to knowledge, learning and education through the use of ICT in the service of society.
- Consejo Nacional de Ciencia y Tecnología (CONACyT)",National Council on Science and Technology: "The National Council on Science and Technology (CONACYT) was created by the willingness of the Congress (H. Congreso de la Unión) on December 29th 1970, as a public and decentralized organism of the Public Federal Administration, member of the education sector, with legal personality and with its own endowment. It is also responsible of the elaboration of science and technology policies in Mexico, in charge of the promotion of public funding for research and innovation"[18]. This council has not the same level as a Ministry.
- Regional State Councils for Science and Technology: these councils are in charge of identifying research and innovation requirements in the respective state, to define the

[18] Source; http://www.conacyt.mx

state policy and implement the programs, to create the respective human capital, to impulse the research, technology development, innovation and also the dissemination of the science required in the respective state,in charge of the promotion of public funding for research and innovation

Promoting Public Agencies and Funders:

- The National Council on Science and Technology as well as the Regional State Councils on Science and Technology are agencies mostly in charge of the promotion of public funding for research and innovation.
- The Federal Ministry of Economy has on the other side some funds focused to promote the industrial sector related to ICT. These programs are more oriented to foster the sector related to the creation of new companies (spin-ups, start-ups)

7.2 National ICT policies

7.2.1 Evolution and current status of National ICT policies

The instruments used to support the ICT policy in Mexico have remained in force for a long time. Most of these instruments are intended to strengthen the ICT industry through the elimination of importation tariffs on raw material or other inputs, stimulating investment in the electronics industry in Mexico, or the creation of clusters or new ICT companies. New instruments were additionally created for the present ICT policy to foster innovation and collaboration between industry and research centres, but these are not sector specific. Until now no special instrument or fund related to supporting research in ICT exists on the national level.. The funds used for this purpose come from the General Fund for Basic Research ("Fondo Sectorial de Investigación para la Educación" SEP-CONACYT.

The sector related national instruments are:

1. Sector Program "**Programa de Promoción Sectorial (PROSEC)"** benefits appliance producers from a wide range of industries, including electronics, through the elimination of custom duties or preferential duties on imports of raw materials, inputs and components, [8/]. This program has been in operation since 2000, and is currently under negotiation.

2. Program of tariffs for the competitiveness of the electronics industry and high-tech economy called **ITA-Plus.** Published in 2002, this program eliminates or reduces custom duties on on a wide range of components and products in the electronics and information technology industries.[8/]

3. Competitiveness Program of the Electronics Industry and High Technology **"Programa de Competitividad de la Industria Electrónica y de Alta Tecnología (PCIEAT)**". Established in 2002, it seeks to offer the conditions necessary for theelectronics industry to prosper in Mexico. The program attempts to recover global competitiveness and to consolidate the country as the centre of the electronics industry in the Americas.[6/].

   Program for the Development of Software Industry **"Programa para el Desarrollo de la Industria de Software (PROSOFT)".** Launched in 2002, it initially focused

on the industry, but since 2004 it has covered the entire IT sector. This program promotes national economic development through the provision of support for projects that encourage the creation, development, consolidation, viability, productivity, competitiveness and sustainability of companies of information technology (IT). [8/]

4. **Technology Business Accelerator (TechBA).** TechBA is a program created by the Mexican Ministry of Economy and operated by The United States - Mexico Foundation for Science. TechBA's mission is to find the most innovative technology-based companies and take them to global markets.

5. Programs for Stimulating Innovation **"Programas de Estímulo para la Innovación".** Founded in 2009, with a budget of around $207 million USD for 2010, these programs are targeted at stimulating companies to invest in R&D, technology development or innovation projects resulting in new products, processes or services.

7.2.2 Important policy documents

The Mexican government considers the ICT policies as tools to achieve national science and technology development.
The table below lists the main documents for integrating and coordinating the national effort to promoting ICT related scientific and technological activities in the country.

Document name ***(original and English)***	**Reference year**	**Short description**	**Coordinating entity**
"Programa Especial de Ciencia y Tecnología e Innovación, 2008-2012", Science, Technology and Innovation Special Program, 2008-2012	2008	Main instrument for planning of the science and research and innovation system. It describes the strategies and actions to undertake, as well the indicators and targets to reach by 2012.	National Council for Science and Technology "CONACYT"
"Ley de Ciencia y Tecnología" , Law for Science and Technology	2002, reformed 2010	This Law establishes the legal basis for the Science and Technology Policy. It defines the roles and authorities of the institutions involved in the definition, implementation of the ICT policy as well as the instruments used. It also establishes the basis for the operation of the public research centers.	Federal Government

For a more detailed description of each of these documents and related programs, see in Annex V "Documents related to current ICT policy".

7.3 Main stakeholders of the ICT field

Various institutions and public sector entities, private, social and external, as well as the respective committees of the government make up the ICT ecosystem in Mexico. The ICT national policies mentioned above were structured to ensure that all of these groups operate in concert.

Stakeholders have been divided in the following groups: ICT associations, Funding agencies, Companies of the ICT sector, Higher education institutions, Research organizations (public and private), Entities participating in R&D projects.

The complete list is presented in Annex V.

ICT associations

- Cámara Nacional de la Industria Electrónica, de Telecomunicaciones y Tecnologías de la Información (CANIETI) http://www.canieti.org/
- Asociación Mexicana de la Industria de las Tecnologías de la Información (AMITI) http://www.amiti.org.mx
- Red Tematica TIC Conacyt http://www.redtic-conacyt.mx/
- La Corporación Universitaria para el Desarrollo de Internet (CUDI) www.cudi.com.mx

Clusters

- Prosoftware http://www.prosoftware.org.mx/
- Monterrey IT Cluster http://www.piit.com.mx/
- Software Centre http://www.centrodelsoftware.com.mx/

Funding Agencies

- Consejo Nacional de Ciencia y Tecnología (CONACyT)-http://www.conacyt.mx
- Secretaría de Economía -http://www.economia.gob.mx
- Secretaría de Comunicaciones y Transportes (SCT)-http://www.sct.gob.mx/coordinacion-de-la-sociedad-de-la-informacion-y-el-conocimiento/-

Higher Education institutions

- Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM)-http://www.itesm.mx
- Universidad Nacional Autónoma de México,- http://www.unam.mx/
- Universidad Autónoma Metropolitana --www.uam.mx
- Instituto Politécnico Nacional www.ipn.mx-

Research organizations (public and private)

- Centro de Investigacion en Matemáticas www.cimat.mx

- Centro de Investigación y Estudios Avanzados del Instituto Politécnico Nacional (Cinvestav-IPN) -www.cinvestav.mx
- Centro Nacional de Investigación y Desarrollo Tecnológico (CENIDET)-www.cenidet.edu.mx

Companies of the ICT sector

IT Components

- Intel Tecnología de México, S. A. de C. V. www.intel.com .
- Compañía General de Electrónica, S.A de C.V.www.cge.com.mx
- Electronica Steren, S.A. de C.V.www.steren.com

IT equipment

- Cisco Systems de México, S. A. de C. V.www.cisco.com
- Hewlett-Packard México, S. de R. L. de C. V.www.hp.com
- Dell México, S.A. de C.V.www.dell.com.mx
- IBM de México Comercialización y Servicios, S.A. de C.V. http://www.ibm.com/mx/es/
- J.R. Electronica, S.A. de C.V. www.interfonos.com.mx

Telecom Services

- Alestra, S. de R.L. de C.V. www.alestra.com.mx
- Eads Telecom México, S.A. de C.V. www.eads.net
- Iusacell www.iusacell.com.mx/
- Telefónica Mexico (Movistar) www.movistar.com.mx
- Unefon www.unefon.com.mx/index.
- Avantel/Axtel http://portal.avantel.com.mx/
- Telmex www.telmex.com
- Telcel www.telcel.com
- Nextel www.nextel.com.mx

Entities participating in R&D projects

Entities with projects under the European FP7 in the ICT Work Program. Up to now only two entities participate with projects under the ICT Workprogram of the FP7: Instituto Tecnológico y de Estudios Superiores de Monterrey and the National Autonomous University of Mexico. The projects names are: OASIS, FIRST, FORESTA, ProIdeal Plus, EELA2.

In EELA2, under the Mexican group of JRU, other Mexican entities also participate: CICESE, CIC-IPN, CUDI, ITESM, Universidad Autónoma del Estado de Morelos, Universidad

Michoacana, Universidad de San Nicolás de Hidalgo, Universidad de Sonora.

There are also a considerable number of bilateral cooperation projects financed by Spain, Germany, France, and the USA. Statistics were not available. Entities which have participated in recent years in bilateral cooperation in ICT research are:

- ITESM (with Germany)
- ITAM[19],CICESE[16],UDLA[20],ITESM[17], UAM-I[21], LANIA[22], INAOE[12], UGTO[23] and UNAM[14] (with France)

7.4 SWOT analysis of national ICT policies

Strengths:	**Weaknesses:**	**Opportunities:**	**Threats:**
1.1. Solid legal basis for Science and Technology as well as for innovation currently exists . 1.2. The institutions for developing and implementing science and technology development policy are cooperating in an efficient way. 1.3. Public research centers are consolidated. 1.4. Funds are stimulating research and technology development and innovation with growing interest of companies in investing in R&D. 1.5. The research and education system is evaluated periodically against standards of	2.1. Deficient and high-priced ICT services. 2.2. No long term policy. 2.3. Weak interaction between research and industrial sectors, as well as weak interaction between players from industrial sector itself. 2.4. Lack of clarity and strength in research and innovation policy for the ICT sector. 2.5. Insufficient infrastructure and low adoption of technology. 2.6 Few companies carry out software-production oriented toward local markets.	3.1. Growing interest of international firms in investing in development and design centers in Mexico. 3.2. Growing interest and opportunities for Mexico in participating in international R&D networks. 3.3. Growing local market.	4.1. Unbalanced regional growth 4.2. Growing competition from emerging countries. 4.3. Competition among the different sectors for governmental budget. 4.4. Problems with fiscal and structural reforms.

[19] Instituto Tecnológico Autónomo de México. http://www.itam.mx/es/index.php
[20] Universidad de las Américas. http://www.udlap.mx/
[21] Universidad Autonoma Metropolitana. http://www.uam.mx/
[22] Laboratorio Nacional de Informática Avanzada. http://www.lania.mx/
[23] Universidad de Guanajuato. http://www.ugto.mx/

efficiency. 1.6. Development of interesting local initiatives such as clusters technology parks supported by federal and local funds.			

1. Strengths:

1.1. Solid legal basis for Science and Technology as well as for innovation currently exists.

There are federal and state laws for Science and Technology which allow for defining programs and action plans by the different authorities and which lay the basis for the design of support instruments. There is still some way to go in the sense of implementation of the law leading to efficient programs and action plans.

1.2. The institutions for developing and implementing the ICT Policy are cooperating in an efficient way.

Through the creation of mixed funds, coming from both federal and state governments, collaboration and coordination between the different national public funding agencies is assured, especially for fostering innovation and regional development. A network of the state councils for science and technology supports best practice exchange and the consolidation of the council system.

1.3. Public research centers are consolidated.

Mexico has 27 public research centers[24], 10 of which are oriented toward life sciences, 8 to social science and humanities, 8 specialized in development and technological innovation, and one in financing postgraduate studies.

1.4. Funds are stimulating research, technology development and innovation with a growing interest of companies to invest in R&D.

For the first time in the history of Mexico, in 2010 investment in R&D coming from industry is expected to be higher than that coming from government. In 2009, the automotive sector led in R&D investment,with the ICT sector in 6th place after food, health, pharmaceutics and agro industrial sectors. In 2009 more than 1664 million pesos of public funds (around $128 million USD) were assigned to support research projects in or for companies. The federal budget designation for Science and Technology for 2009 was approximately 15,450 million pesos (around $1,190 million dollars) about 0.46 % of the BIP. Nevertheless, it is still below the average investment in terms of % of the BIP for OECD countries. Mexico's 2010 science budget is about US$1,213 million dollars — a two per cent increase over 2009[25].

[24] Known in Spanish as *Centros CONACYT.*

[25] Source: http://www.scidev.net/es/latin-america-and-caribbean/news/m-xico-reduce-su-presupuesto-para-cyt-en-2010.html.

See in Annex V, "Budget of the National Council for Science and Technology"

1.5. The research and education system is evaluated periodically against standards of efficiency.

Since 2001 there has been a national program to evaluate postgraduate programs in Mexico, "Programa Nacional de Posgrados de Calidad". Currently 1200 master's degree or doctoral programs are incorporated in this system. There are 2 levels for qualification: programs with international-level competence and consolidated programs. An additional program, "Programa de Fomento a la Calidad", is dedicated to evaluation of programs in development or of recent creation[26].

A National System of Researchers was created in 1984 to motivate persons dedicated to research by providing official acknowledgement of their level of research and a corresponding financial stipend.

1.6. Development of interesting local initiatives such as clusters of technology parks supported by federal and local funds.

Clusters located in Mexico were driven by demand. They are located in areas characterized by strong economic activity.

Because the barriers to entry in the software area are relatively low, the creation of new businesses to serve local clients has been relatively fast since the past decade[27].

However, in some cases the process of growth has been sustained by the strong involvement of transnational corporations (Microsoft, IBM, Oracle, SAP).

There are currently 21 ICT Clusters distributed throughout Mexico. The largest clusters are located in Mexico City, Monterrey, Guadalajara and Aguascalientes. The ones which are classified as the most competitive are: IT@Baja, IJALTI, Prosoftware, CsoftMty, MIT Cluster and New Media[28].

As of 2010 Mexico has 23 Technology Parks oriented to ICT in different stages of development, some of recent creation and others which have been in operation for some time.[29].

2. Weaknesses:

2.1. Deficient and high-priced ICT services.

Compared to international prices for telecommunication services, Mexico still has very high prices. A service of around 1.5 to 2 megabits costs approximately $11 USD per month and efficiency is about a third, compared to the international average for the same price for a service of 8 megabits per second.

See in Annex V, "Comparation of prices for telecom services".

[26] Source: www.conacyt.mx: 2010

[27] El Cluster de TICs en el Estado de Chihuahua Diagnóstico y Estrategia. Curiel, Koller, Soto-Villalobos. 2008. MRKapital. Available on line at http://portaladm.chihuahua.gob.mx/atach2/economiadigital/uploads/Estudio_TICs.pdf

[28] Estudio de Competitividad de Clusters de TI en México, UNAM 2007 http://www.cysp.com.mx/Ima/Amiti/Documentos%20Descargables/08_08_Competitividad_Clusters_TI.pdf

[29] Reporte sobre Parques Tecnológicos. Available on Line at http://www.cysp.com.mx/Ima/Amiti/Documentos%20Descargables/2009_Parques%20tecnol%C3%B3gicos_EconomiaDigital.pdf.

2.2. No long term policy.
Administrative periods of the elected governments are 6 years for federal and state institutions, and 4 years in municipalities. The career of government employee does not exist as such. It is only as of 4 years ago that public employees have had to undergo a specialized exam to be accepted in public service. Middle and upper management employees are employed as long as an administration lasts. Continuity in their job is not assured after administration changes. Consequently, the continuity of government policies is also affected.

2.3. Weak interaction between the research and industrial sectors, as well as in the industrial sector itself.
There is lack of innovation from SMEs and lack of research and development from big companies. Links between university-government-enterprise are still very weak with regard to developing R&D.

2.4. Lack of clarity and strength in research and innovation policy for the ICT sector.
The existing programs still require fine-tuning to define the country's priorities in policy formulation. This can be seen in the fact that there is not a special fund for ICT research. Nevertheless, the importance of ICT usage is recognized as one of the main drivers for reaching a high level in competiveness of the country, and therefore a special program, "ProSoft", was created to support the creation of new companies as well as clusters.

2.5. Insufficient infrastructure and low adoption of technology.
Even considering a growth in broad band services of more than 70% in the last 4 years, México is still below the average of OCDE countries. 18.4% of homes have an internet connection. According to Telmex, the leading telecommunication company in Mexico, 7.4 million homes have computers, of which 32 % do not have an internet connection due to the high costs of such a service. (Source: La Jornada, 17 May 2010).
See in Annex V, "Data about IT usage".

2.6. Few companies carry out software-production oriented toward local markets.
As the penetration and adoption of Information Technologies is still low in comparison to other Latin American countries, products for the local market are not considered to be as attractive as production for the international market.

3. Opportunities:

3.1. Growing interest of international firms to invest in Mexico in development and design centers.
In the last 3 years a growing interest of international firms in investing in Mexico in research and development centers has been observed. Examples are the CISCO university research program, WIMAX project from Axtel and Intel Mexico.

3.2. Growing interest and opportunities for Mexico in participating in international R&D networks.
The increasing cooperation with the European Union during FP6 and FP7 stands as an example. From 4 projects under FP6 in the ICT Program, Mexico now has 6 projects running under FP7.

Statistics on the growing interest in bilateral cooperation were not available. Nevertheless it is known that competition for funds has become increasingly more difficult.

3.3. Growing local market.

The weight of ICT in the GDP rose from 4.02% in 2000 to 5.35% in 2009.

The telecommunication sector reached a growth of 6.3% during 2009 (based on income for this industrial sector)[30].

4. Threats:

4.1. Unbalanced regional growth

More than 70% of the ICT companies are concentrated in only four states: the Federal District, Jalisco, Sinaloa and Nuevo Leon[31]. Nearly 50% of the research capacity is concentrated in the central region of Mexico[32].

4.2. Growing competition from emerging countries.

India and China are the recognized giants in the emerging countries. Even at the Latin American level, there are countries much more advanced than Mexico, e.g. Chile and Brazil.

4.3. Competition between the different sectors for governmental budget.

Due to the crisis years 2008 and 2009, the federal budget has been reduced. There is strong competition among the different ministries, as well as among the different industrial sectors. During 2009, the automotive sector was privileged in funding for innovation.

Most of the programs created by the government are social-oriented, considering mainly financial aid to children, old people, basic education, etc. without including science and technology as main areas of interest. Most candidates for government positions focus on developing programs to help the population in terms of health and nutrition, leaving support for technology and research up to local industries.

4.4. Problems with fiscal and structural reforms

For several years, a fiscal reform has been discussed in the lower house of the legislature, " cámara de diputados". In 2009 a first reform was passed, leading to higher taxes (VAT, income tax, tax on cash deposits in bank accounts). This reform has been highly criticized as it mostly affects the middle-income population, who make up less than 20% tax population[33]. This reform did not provide more income for the states or municipalities.

Structural reforms related to the telecommunication sector are needed in order to allow fair and healthy competition and prevent the monopolization of the market.

[30] Source: CIU, 2009: www.the-ciu.net.
[31] Source: Massachusetts Office of International Trade and Investment, Dec. 2007
[32] Source: PNCS-TIC, 2010
[33] Los Impuestos en México, ¿quién los paga y cómo?. Available on line at http://www.presupuestoygastopublico.org/documentos/incidencia_ingreso/Folleto_Impuestos_Mexico.pdf

7.5 Conclusions

The interaction of the four ICT perspectives in the country (*See in Annex V, "Different perspectives about IT in Mexico"),* should result in an integrated Science and Technology National System (called SNCYT by the federal government) [34] through the inclusion of all stakeholders for the development of science education, technology and innovation. SNCYT should give Mexican society the ability of assimilate and generate knowledge and transform material goods in other higher value goods and services[35].

Despite recognition of its importance, Mexico has not succeeded in placing ICT in correspondence with the size of its economy. The indicator of Global Competitiveness places the country in 60th place, Technological Readiness in 71st, and Innovation in 78th place[36]. Other indicators provide a clearer vision of Mexico's disadvantage compared to most OECD countries on indicators relevant to the information society.[37]. Mexico remains one of the OECD countries with the least capacity to invest in R&D, and this is reflected in its competitiveness and economic development[38].

To strengthen sustainable development, a coordinated participation of all the National Science and Technology organisms (SNCYT) , plus sufficient public and private financing is required. In Mexico national financing of science and technology has two major components: on one side is the public sector, including public administration, CONACYT and federal entities and, on the other side, investment made by the private sector. The main contribution of investment in science and technology has traditionally come from the public sector, but funding has been insufficient to achieve globally competitive standards in ITC activities. It is necessary to attract investment from sources not subject to the process of allocating public funds, including resources from countries and international organizations.

Future trends and areas of common interests

The Mexican government has been strongly supporting the development of the IT services industry in the country and Mexico has favorable conditions as a source for captive or outsourced offshore IT, specifically for application development services, business process services and call centers[39].

By end of 2009 and beginning of 2010 several cooperation projects with the European Union in

[34] SNCYT , acronym for the name in Spanish; *Sistema Nacional de Ciencia y Tecnología.*
[35] Diagnosis of Science Policy, Technological Development and Innovation in Mexico, 2000-2006. Foro Consultivo Científico y Tecnológico
[36] The Global Competitiveness Report 2009-2010. World Economic Forum. Available on line at http://gcr.weforum.org/gcr09/.
[37] Information and Communications Technologies OECD Information Technology Outlook 2006: Chapter 5. Digital Broadband Content: Developments and Challenges. Available online at http://miranda.sourceoecd.org/vl=8103048/cl=11/nw=1/rpsv/ij/oecdthemes/99980134/v2006n16/s8/p226
[38] In the OECD, the average investment in that category was 2.25% in 2005, while the European Union (EU27) stood at 1.74%.
[39] Analysis of Mexico as an Offshore Services Location. Karamouzis and Dreyfuss. 2009. Gartner Research

the ICT field as well as national initiatives involving the academic, governmental and industrial sectors had been started. *For more detail, see the last point of Annex V.*

8 URUGUAY

8.1 ICT sector overview

In Uruguay, during the last ten years there has been a significant progress in regard to the penetration of ICT in the population, this can be appreciated in the increase of mobile subscribers and Internet subscribers. In addition, the Gross Domestic Expenditure on R&D has more than quadrupled between 2000 and 2009. Telecommunication Infrastructure Investment in total has had a huge increase between 2003 and 2009. These last two indicators reflect an effort to improve the infrastructure and to promote research and development in Uruguay.

8.1.1 Key indicators

	2000	**2003**	**2006**	**2009**
1. Country population (millions)[40]	3,32	3,33	3,33	3,34
2. GDP per capita (U$S) (at current prices of the data's date)	6320	3689	4996	6915
3. Weight of ICT in GDP	N/D	N/D	N/D	N/D
Weight in GDP of the following sub-sectors*: • Telecom services	N/D	N/D	3,8%[41]	3,1%[42]
4. % national budget dedicated to ICT	N/D	4,9%[43]	N/D	4,3%[44]
5. Mobile subscribers in total / per 100 inhabitants	12,37	14,96	69,96	104,73
6. Internet subscribers in total / per 100 inhabitants	10,34	15,94	25,53	40,01
7. Broadband subscribers in total / per 100 inhabitants	N/D	N/D	6.38	7,3
8. Internet penetration in total / per 100 inhabitants	N/D	N/D	6,39	8,53

[40] Stadistics National Institute (INE) - www.ine.gub.uy/
[41] Telecom Services - Wold Bank Database - data.worldbank.org/data-catalog
[42] Telecom Services in 2008 - Wold Bank Database - data.worldbank.org/data-catalog
[43] Wold Bank Database - data.worldbank.org/data-catalog
[44] World Bank Database, 2008 - data.worldbank.org/data-catalog

9. % of businesses with 10 or more employees using the Internet	N/D	N/D	N/D	N/D
10. Share of ICT-related occupations in the total economy in selected countries	N/D	N/D	N/D	N/D
11. Telecommunication services revenue in total	N/D	N/D	N/D	N/D
12. Mobile telecommunication services revenue in total	N/D	N/D	N/D	N/D
13. Telecommunication infrastructure investment in total (Current USD)	N/D	$30.000.000 [45]	N/D	$52.900.000 [46]
14. Gross Domestic Expenditure on &D – GERD	47,8	32,4	69,7	206,7
15. ICT-related patents as a percentage of national total	N/D	N/D	N/D	N/D
16. Technology Balance of Payments (TBP)	N/D	N/D	N/D	N/D
• Technology balance of payments: Receipts (million current euros)	N/D	N/D	N/D	N/D
• Technology balance of payments: Payments (million current euros)	N/D	N/D	N/D	N/D
19. Total number of ICT companies	N/D	N/D	N/D	2350[47]

The sources in which information was sought were CEPAL (Economic Commission for Latin America and the Caribbean), COMTRADE UN (United Nations), INE (Statistics National Institute), World Bank, CUTI (Uruguayan Chamber of Information Technology), LATU (Technological Laboratory of Uruguay), OBSERVATIC (ICT Observatory), Digital Planet 2008 Database (WITSA - World Information technology and Services Alliance) and RICYT (Science and Technology Network Indicators).

8.1.2 Institutional structure

The diagram below illustrates the structure and relations of governmental organizations with competences in ICT in Uruguay:

[45] Investment in telecoms with private participation - World Bank Database - data.worldbank.org/data-catalog

[46] Investment in telecoms with private participation (2008) - Wolrd Bank Database - data.worldbank.org/data-catalog

[47] CUTI (Uruguayan Chamber of Information Technology) - www.cuti.org.uy/

Fig. 9 - Uruguay ICT Institutional Structure

Regarding the role of the main institutions with competences in ICT in Uruguay, the following can be highlighted:

- The ANII's (National Agency for Research and Innovation) mission is to run Uruguay's political-strategic guidelines in order to promote research and innovation, articulate and strengthen the capacities of the National Innovation System to achieve productive and social development in the country. This agency, gives special importance to R+D, the programmes carried out by ANII are explained in 9.2.2.
- The National Council for Innovation, Science and Technology (CONICYT) is composed of representatives of various organizations related to science, technology and innovation. Its aim is to find ways of cooperation between these organizations and advise the executive and the legislature.
- The Ministerial Office of Innovation (GMI) main objective is the coordination and articulation of government actions related to the activities of Innovation, Science and Technology for development.

- There exists another important organism in relation to the Information Society and ICT, the AGESIC (Agency for the Development of Electronic Government Management and Knowledge and Information Society) that aims to improve services to citizens, using the possibilities offered by Information Technology and Communication (ICT). This organism depends on the Presidency of the Republic.

8.2 ICT national policies

8.2.1 Evolution and current status of National ICT policies

Uruguay is undergoing a transformation in its National Innovation System, in 2005 was created the Ministerial Office of Innovation (GMI) that has changed the institutional design of the Innovation System, this is the reason why it is not yet possible to analyze the impact of these changes. On February 25, 2010 was approved the PENCTI (Science, Technology and Innovation National Strategic Plan) and is required some time to analyze their results. The PENCTI is part of the so-called "Uruguay Innovator" that is a proposed reform of public policies aimed at developing the capabilities of the National Innovation System in Uruguay.

The new institutional design began in April 2005 with the creation of the Ministerial Office of Innovation (GMI), composed by the Minister of Livestock, Agriculture and Fisheries (MGAP), the Minister of Industry, Energy and Mining (MIEM), the holder Office of Planning and Budget (OPP), the Minister of Economy and Finance (MEF) and the Ministry of Education and Culture (MEC), presiding. Subsequently, in December 2006 the parliament passed the law 18.084, which confers legal status to the GMI (Ministerial Office of Innovation), and gives to this institution a central role in setting policy and strategy guidelines in Science, Technology and Innovation. The law proceeds on the new design by establishing roles and responsibilities to two other relevant actors: the National Agency for Research and Innovation (ANII) operational arm of government policies and priorities of the Executive on the subject, and the National Innovation Council of Science and Technology (CONICYT), which was expanded and revitalized as a consultative and advisory body of the system.

An other important instrument, which is still in force, is the Digital Agenda 2008-2010 which objectives are the identification, prioritization and monitoring of programs and strategic projects to advance in the development of ICT; and, in prioritizing strategic plans and projects, organizing and disseminating in order to establish an overview and to promote continuity and projection based on monitoring and consistency mechanisms. The agency responsible for carrying out this agenda is AGESIC which depends on the Presidency of the Republic. The agency works with technical autonomy and communicates with the Executive Branch through the Office of Planning and Budget (OPP). From 2011, should be current a new Digital Agenda, which will seek to grow on the existing infrastructure created by the Digital Agenda 2008-2010.

The implementation of the PDT (Technology Development Program 2002 - 2008) is over, it lasted five years, its instruments and calls have no more validity and the PENCTI is now responsible for the development in Science, Technology and Innovation.

Current ICT policy

The current ICT policy in Uruguay is the PENCTI (Science, Technology and Innovation National Strategic Plan). This is a national plan that has received funding from both the World Bank (Strengthening the Research and Innovation System, FOSNII) and a grant from the Korean Cooperation Fund implemented by the Inter-American Development Bank (ATN/KK-10271-UR).
The Inter-American Development Bank (BID) signed the Agreement of technical cooperation grants entitled "Preparing the National Strategic Plan for Science, Technology and Innovation (PENCTI).

The general objectives of the PENCTI are the following:

- Strengthen scientific and technological system and its relationship with productive and social reality.
- To enhance the competitiveness of productive sectors in the context of globalization.
- Development of skills and opportunities for social appropriation of knowledge and "inclusive" innovation.
- To educate and train the required human resources.
- Development of a system for forecasting, monitoring and technology assessment to support the achievement of other objectives, and evaluation of public policies and instruments of CTI (Science, Technology and Innovation).

The main priority lines of this plan are training of human resources in research, management and production. Also is expected to enhance productivity and competitiveness based on innovation, quality improvement and management. In addition to this, another priority is to create a promotional framework for innovation consolidation. It is also aimed to strengthen scientific and technological infrastructure. Finally, it is expected to popularize Science and Technology.

Below are listed some actions that have been designed for the ICT area:

- Establishment of a program for promoting computer education; and, technicians and professionals training.
- Promote SSI product certification systems.
- Creation of SSI quality centres of excellence and implementation of technical support mechanisms and public awareness efforts.
- Creation of a fund in the area of ICT, with participation of Government, Business and Academia sectors in the definition of finance programs.
- New business opportunities strengthening funding support to the ICT sector.
- Include a larger ICT component in production, with emphasis on export supply.

Previous ICT policy

The previous policy designed in Uruguay was the PDT (Technology Development Program 2002 - 2008). In this point we will also analyze the Uruguay Digital Agenda 2008-2010 that is still a current policy. The entity responsible for the PDT was the Ministry of Education and Culture (MCE) and the agency responsible for Digital Agenda is the Agency for the Development of Electronic Government Management and Knowledge and Information Society (AGESIC) for the Agenda.

The PDT aimed to develop an enabling environment for technological development, through innovation, from the educational, scientific, technological, legal and financial point of view. To create and enhance that environment is required of a National System of Innovation (SNI), a network of public and private institutions whose activities and actions initiate, import, modify and disseminate new technologies.

The Digital Agenda goals related with ICT are the following:

- "Equity and Social Inclusion": generating more and better opportunities for the use and ownership of ICT for people, particularly groups and sectors disadvantaged and / or excluded.
- "State Transformation": achieve organizational and technological updating of the Public administration, streamlining and focusing its resources towards electronic services (E-services) oriented to citizens that allow an improvement the effectiveness and efficiency of its activities.
- "Knowledge-Based Economic Development": encourage the use of ICT for productive development of the country, promoting the generation of quality products with added value in knowledge. Encourage the ICT industry and digital content production and use of ICT by Small and Medium Enterprises (SME).
- "Culture, Education and Knowledge Generation": encourage the educational use of ICT as promoters of cultural development in general, strengthening the capacities needed for the production of innovation and knowledge.
- "Regional Integration and Insertion": Consolidating the regional integration framework that promotes development, encouraging the renovation and/or creation of technological, policy and regulatory framework, necessary for the electronic exchange of information.

8.2.2 Instruments associated and managing organizations

The PDT (Technology Development Program) focused in three areas: support for innovation and improving competitiveness of enterprises, development and application of science and technology and National Innovation System Institutional Strengthening and was conducted by the Ministry of Education and Culture (MEC). The ADU 2008-2010 is much more inclusive and involves many more actors to achieve their goals. The institutions involved in ADU (Agenda Digital Uruguay) are: ANEP (National Administration of Public Education), LATU ((Technological Laboratory of Uruguay), ANTEL (Telecommunications National Administration), CUTI (Uruguayan Chamber of Information Technology), PACC (Program of Competitiveness for clusters and production chains), MEC (Ministry of Education and Culture), AGESIC (Agency for the Development of Electronic Government Management and Knowledge and Information Society), Correo, OPP (Planning and Budget Office), RAU2 (Uruguay Academic Network), UDELAR (University of the Republic), Empretec, MEF (Ministry of Economy and Finance), ANII (National Agency for Research and innovation) and the parliament.

The ANII (National Agency for Research and innovation) is the agency responsible for executing the PENCTI (National Strategic Plan for Science, Technology and Innovation). This agency is a comprehensive institution, advised by the CONICYT (National Council for Innovation, Science and Technology). The ANII strategic guidelines dictated by the Ministerial Office of Innovation (GMI) are: Research and Development, Transfer of Technologic and Scientific Knowledge, Human resources Strengthening, Business Innovation, Articulation of the national innovation system and Entrepreneurship.
The ANII develops National Innovation System Articulation in the following areas:

- Market and / or territorial programmes
- Energy sector fund
- Health sector fund

- Strengthening of scientific and technological services

The CONICYT (National Council for Innovation, Science and Technology) is composed of representatives of various organizations related to science, technology and innovation. Its aim is to tend towards finding ways of cooperation between them and advise the executive and the legislature. This organism has and advisory and consultative function towards the Ministerial Office of Innovation and is encharged of monitoring ANII's programmes and, specifically, the PENCTI (Science, Technology and Innovation National Strategic Plan).

The GMI (Ministerial Office of Innovation) is composed by the Minister of Education and Culture, the Minister of Economy and Finance, the Minister of Industry, Energy and Mines, the Minister of Livestock, Agriculture and Fisheries and the Director Office of Planning and Budget. Its main objective is the coordination and articulation of government actions related to the activities of Innovation, Science and Technology for development. In relation to the PENCTI, the GMI was responsible of preparing the plan. And, nowadays, is encharged of coordintating policy and strategy and of evaluating and tracking the plan.

Another current plan, running since 2006, is the "Basic Informatics Educative Connectivity for Online Learning", better known as "Plan Ceibal" that is a socio-educational project developed jointly by the Ministry of Education and Culture (MEC), the Technological Laboratory of Uruguay (LATU), the National Telecommunications Administration (ANTEL) and the National Public Education Administration (ANEP). The Executive has commissioned LATU technical and operational implementation of the Plan Ceibal.

Regarding the current ICT Policy in Uruguay, it can be highlighted the PENCTI (Science, Technology and Innovation National Strategic Plan). The main entity responsible for executing the project is the ANNI (National Agency for Research and Innovation) that was created by the law 17.930 in December of 2005 and is the agency responsible for implementing the policies, organization and management plans, programs and instruments for scientific and technological development and deployment and strengthening of innovation capacities. The main objectives of the National Agency for Research and Innovation include the design, organization and administration of plans, programmes and instruments for scientific and technological development and deployment and strengthening of innovation capacities.

Regarding Agenda Digital Uruguay 2008-2010 (this instrument is still running) is AGESIC (Agency for the Development of Electronic Government Management and Knowledge and Information Society). This agenda includes twenty-five specific goals and targets. These goals are related to targets with specific responsibles for the execution, so they can be considered instruments for developing ICT in Uruguay (we will analize this programme as instrument 1). Following are mentioned the goals and targets related to ICT:

- To give, via the CEIBAL Plan, portable personal compoters to all students.
- To connect all schools by 2008 and all rural schools by 2009 by Educational Connectivity Program – PCE.
- To promote access and appropriation of ICT by the population, increasing the number of centres of access to information society, based on projects involving public – private sectors.
- To improve productivity, competitiveness and international integration of ICT companies, based on the partnership and the creation of new business models and other initiatives.

- To promote the development of small and medium enterprises to link the distribution of cultural content to the use of new digital networks such as Internet, mobile phone or digital TV.
- To have available for 2008 an updated version of the Educational Portal of the MEC with online educational resources, publications, interviews, theses and research, forums and online courses.

- To build a physical network of high-speed communications, connecting central offices Executive Units of Public Administration.
- To provide policy, institutional and technical instruments that enable the interoperability and widespread the use of electronic records across government Public..
- To promote best practices in electronic government within public institutions.
- To provide connectivity to all universities and research centres in the country and to create a unique database of researchers by 2010.
- To promote social inclusion of sectors have difficulty entering the labour market disseminating knowledge about the technological tools that allow teleworking and facilitating the use of ICT to generate employment.
- To create new areas of excellence in innovative fields, integrating Science and Information Technology and Communication with other disciplines, and seeking future insertion of the graduates at the national level.
- To Increase the number of graduates in the area of ICT in higher education system.
- To update the regulatory framework on Electronic Government and Information Society.
- To strengthen the institutional framework on Electronic Government and Information and Knowledge Society in regulatory issues.

Finally, regarding previous ICT policies, the PDT (Technology Development Program), the insttitution responsible of the programme was the Ministry of Education and Culture (MCE):

The Technology Development Program is structured around three subprograms containing several instruments:

- Subprogram I, "support for innovation and improving competitiveness of enterprises".
- Subprogram II, "development and application of science and technology"
- Subprogram III, " National Innovation System Institutional Strengthening".

8.2.3 Important policy documents

Document name	Reference year	Short description	Coordinating entity
Aprobación del Plan	2010	Explanation about	Minister of Livestock, Agriculture

Estratégico Nacional de Ciencia, Tecnología e Innovación (PENCTI). DEC. Nº 82/010 Adoption of the National Strategic Plan for Science, Technology and Innovation (PENCTI). DEC. Nº 82/010		the PENCTI: history, assumptions, historical principles and objectives.	and Fisheries (MGAP) Minister of Industry, Energy and Mining (MIEM), the Minister of Economy and Finance (MEF) Ministry of Education and Culture (MEC) http://www.presidencia.gub.uy/_web/decretos/2010/02/1468.pdf
Final Report of consultancy of ICT in the PENCTI Framework	2010	Report in PENCTI framework	ANII (National Agency for Research and Innovation) http://www.anii.org.uy/imagenes/libro_tic.pdf
PENCTI Fundamental Guidelines for discussion	2008	PENCTI Fundamental Guidelines	GMI (Ministerial Office of Innovation) Operational Team (EO) http://www.anii.org.uy/imagenes/pencti.pdf
Uruguay Digital Agenda for the Information and Knowledge Society 2008-2010	2007	ADU 2008-2010 strategic lines and objectives	AGESIC (Agency for the Development of Electronic Government Management and Knowledge and Information Society) http://www.agesic.gub.uy/innovaportal/file/447/1/Agenda_Digital2008-2010.pdf

8.3 Main stakeholders of the ICT field

ICT associations

The CUTI (Uruguayan Chamber of Information Technology) has had a really important place in the development of ICT in Uruguay. It was founded in 1989 and is a center of reference and active partner in IT-related institutions, such as incubators, academic-industrial centers, universities, technology parks, guilds and associations. CUTI integrates a vast network of organizations and local institutions related to IT, which is key factor for dynamic and articulation.

The network "Uruguay, Information Society" (USI) aims to reduce the "digital divide", trying to make all citizens have an opportunity in the knowledge society. The USI program was approved by the ANTEL Board in March 2002. The USI was originally called "Mercury Community."

Companies of the ICT sector

There are about 350 software development, consulting, services and Internet companies, plus nearly 400 sellers of hardware and software and about 1.600 one person businesses or independent professionals, who operate primarily in the consulting and services segment. The ICT activity is knowledge-intensive and therefore intensive in qualified human resources. The expansion experienced in the production and sale of products and services, has been accompanied by a strong growth in employment. Different ICT industry segments, including the State, employ over 8,000 workers.

Uruguayan software industry and IT services consists mostly of small businesses. Considering the number of employees, most of the 350 companies in the sector are SMEs that operate with few staff, highly qualified and billing / person generally high.

Private domestic companies:

ARTech is the leading company in software development tools based on automatic management of knowledge. Its product, GeneXus27, has been exported to over thirty markets around the world; the company has offices in USA, Mexico and Brazil, and a wide network of distributors and business partners. Other company that can be highlighted is Ideasoft, that has an own technology platform that includes Business Intelligence technologies, called IdeaSoft O3. This company, although is not within the SSI largest companies, is developing a product whose characteristics allow Artech a core position as innovator in the local market.

Another important company regarding its size and international presence is GROUP Quanam. Quanam is a professional services firm specialized in information technology, which has offices in 9 countries (Mexico, United States and seven countries of South America).

Public companies:

Two state companies are service providers in the ICT market. One is UTE (Electric Transmissions and Plants National Administration), which through its consulting unit, Conex, involved in consulting and services segment, operates both in the external market as well as internally (in this case, with a strong presence in the demand for other public bodies). The other state-owned company in the TIC market is ANTEL, the leading operator in the area of Internet access and data transmission, who through its business unit Antel Data, set up two companies that operate in private law:

- ITC (Intelligence in Telecommunications), carries out technical advice and assistance in the telecommunications, IT and business management areas, for domestic and foreign customers as well as ANTEL.
- HG, created to take over the management of the ambitious project of universal access to Internet and lower communications costs.

International companies:

In the segment of development, the presence of international companies is low, the main company in this market is Trintech, an Irish company that entered the market by acquiring a local firm. In the consulting and services segment is important the presence of TCS Tata Group, who settled its development center for Latin America in Uruguay in 2002. Other companies that stand out in this segment are BULL (a french capital company), established in Uruguay for many years, the Chilean company PROBE, IBM and MICROSOFT from the United States and SOLUZIONA from Spain.

Funding agencies:

The following institutions provide financial assistance to productive projects. They are grouped according to the service they provide: Venture Capital, Capital to start the company (Seed Capital), and Co-financing.

- Venture capital: Prosperitas: it provides venture capital. The UIVC1 fund focuses on technology industries, services and agribusiness
- Seed capital: Fondo Emprender, Fondo Zonamerica and Kolping Uruguay.
- Co-financing: FDI, FONADEP and PMAP.

ANII (National Agency for Research and Innovation) was created by law 17.930 in December 19, 2005 and is the agency responsible for implementing the policies, organization and management plans, programs and instruments for scientific and technological development and deployment and strengthening of innovation capacities.

AGESIC (Agency for the Development of Electronic Government Management and Knowledge and Information Society) is an agency under the Presidency of the Republic. The agency has technical autonomy and communicates with the Executive Branch through the Office of Planning and Budget (OPP). It aims to ensure improved services to citizens, using the possibilities offered by Information Technology and Communications (ICT).

Higher education institutions:

As regards the training of specialists in ICT, the current public offering is relatively undiversified. At the technical medium level is the Bachelor in Information Technology issued by the UTU (Labour University of Uruguay). At tertiary level, is the career in Computer Technologist recently created jointly by UTU (Labour University of Uruguay) and UdelaR (University of the Republic), and a short career, Technician in Networks and Telecommunications. Both, at technical and tertiary levels, the quotas are extremely low regarding the demand. Regarding public universities, graduate courses related with ICT are Computer Engineering and Electrical Engineering, and postgraduate courses include Masters and PhD in Computer Science and Electrical Engineering, Master of Computer Engineering, and two Specialization Diplomas, all taught in Engineering Faculty of UdelaR (University of the Republic). The private offering has an important role in the system and includes from technical courses of different types and profile dictated by a variety of

institutions, through technical high schools, to university degree (Degree in Systems, Degree in Computer Systems, Computer Engineering, Telecommunications Engineering, Electronic Engineering, Telematic Engineering) and postgraduate in ORT University, Catholic University, University of Montevideo and South Autonomous University.

Research organizations:

Research capacities are concentrated almost entirely in the UdelaR (University of the Republic), although research groups in some private universities are being developed, such as in ORT University. The main research center is the Computing Institute (INCO), part of the Engineering Faculty of the University of the Republic. The INCO has been adding to its traditional areas of research - strong theoretical content - more applied lines, which has generated a growing number of joint R & D projects with public and private organizations.

Another organization that deserves special attention is the Software Testing Center (CES), a consortium formed by the Ricaldoni Foundation of the University of the Republic, the Uruguayan Chamber of Information Technology. The CES provides services in three key areas: software testing (testing), software test laboratory tests on various platforms and software technology observatory. In the laboratories associated program is highlighted the software NET Solution Center, inaugurated by ZONAMERICA, Microsfot Uruguay and ARTech, with support from Hewlett Packard.

Another organization of interest is the Academic Industrial Center of Information Technology Information (CAITI), whose main objective is the promotion of partnership between software companies and academic institutions. The CAITI was created from the initiative of universities with CUTI.

LATU (Technological Laboratory of Uruguay) is an organization founded in 1965 as a collaborative effort between the official and private sectors. Its mission is to promote sustainable development of the country and international integration, through innovation and valuable solutions transfer.

ORT University is the largest private University of Uruguay, with more than 11.000 students in five faculties and institutes. In 2009 was created the Innovation and Entrepreneurship Center (CIE) of the university. The CIE aims to encourage innovation and entrepreneurialism, promote initiatives and strengthen links between entrepreneurs, academic units, companies and support organizations. Provides students and graduates the opportunity to think about innovations and turning them into high potential businesses, contributing to the development of new enterprises that generate employment.

Entities participating in R&D projects:

Cooperation LATU (Technological Laboratory of Uruguay) – BID (Inter-American Development Bank): The plan "Basic Informatics Educative Connectivity for Online Learning", better known as "Plan Ceibal" is a socio-educational project developed jointly by the Ministry of Education and Culture (MEC), the Technological Laboratory of Uruguay (LATU), the National Telecommunications Administration (ANTEL) and the National Public Education Administration (ANEP). The Executive has commissioned LATU technical and operational implementation of the Plan Ceibal. The Inter-American Development Bank (BID) approved in late 2009, a loan of USD 6 million to support the consolidation at the primary level and expand the scope to secondary level education.

The Software Testing Center (CES) is an institution that provides services to evaluate the quality of products. Also anticipates technological changes, provides information on the latest

technologies and builds a lung of innovation in the IT area, participating in technology development. The CES is a consortium conformed by Julio Ricaldoni Foundation, Engineering Faculty, University of the Republic and CUTI (Uruguayan Chamber of Information Technology). It is sponsored by the Economic Union in the framework of the Technology Development Project in Key Sectors of the Uruguayan Economy.

8.4 SWOT analysis of national ICT policies

Strengths:	***Weaknesses:***	***Opportunities:***	***Threats:***
1.1 High quality of human resources 1.2 Tax measures that promote the development of ICT sector 1.3 Existence of a plan for promoting ICT use at primary school: Plan Ceibal 1.4 The existence of an encompassing and long-term plan to develop Science, Technology and Innovation: the PENCTI (Science, Technology and Innovation National Strategic Plan)	2.1 Exports: cumulative growth rates below the world average, and high concentration in the leading companies 2.2 Telecommunications infrastructure with no enough bandwidth and not competitive cost in relation with the rest of the world	3.1 Exports: Opportunities for innovative companies 3.2 High capacity and speed to select and adopt new Technologies. 3.3 Good laboratory (ability of replicating ICT products to other cultures).	4.1 Shortage in the quantity of human resources in relation to demand 4.2 R&D associated to the scientific / academic, private and public sectors not enough developed

Strengths:

1.1 High quality of Human Resources:

Human resources in Uruguay have a high quality because the country was pioneer in Latin America in developing careers in Systems Engineering and Systems Analyst. Although, there is not quality problem in human resources there is a problem in the quantity of human resources in relation to demand, as will be seen in the analysis of the weaknesses. The ICT sector in Uruguay have been characterized for its high flexibility and ability to solve problems and work in teams to develop technology solutions adapted to the specific characteristics of customers and many varied environments.

1.2 Tax Incentives:

In the late 1990s the State adopted several tax measures:

- Decree 84/99 of March 1999, which declared of national interest for the production of software.
- Exemption from payment of IRIC to the production of software (Decree 387/00, 2000). This exemption was extended until December 2009.
- Exemption from payment of VAT on export of software and computer services, Decree 386/00, 2000.
- Exemption from withholding on account of income tax on imports of software, decree (144/02 2002).

This is important because many of the companies, following a strategy of diversification, are themselves importers of software for merchandizing in the domestic market. These instruments facilitated the transparency of information in the field and prevented the creation of artificial stimuli that would force the relocation of businesses to Free Trade Zones.

1.3 Existence of a plan for promoting ICT use at primary school: Plan Ceibal

The implementation of the Plan Ceibal (Basic Informatics Educative Connectivity for Online Learning) is an example of how industry is encouraged by the State through the use of technology at the schools of the whole country. The plan is under the framework of the Equity Program for Equity Access to Digital Information, organized by the Presidency of the Republic. This project seeks to facilitate ICT access for the inhabitants of Uruguay, through Public Schools students. This project has a significant impact on educational and social level, creating a potential to explore and exploit in this framework.

1.4 The existence of an encompassing and long-term plan to develop Science, Technology and Innovation: the PENCTI

PENCTI is part of the so-called "Uruguay Innovator" that is a proposed reform of public policies aimed at developing the capabilities of the National Innovation System in Uruguay. The existence of a development plan of science and technology is a key factor for the development of the ICT industry. As well as, the new institutional design that promoted the creation of the Ministerial Office of Innovation (GMI), composed by the Minister of Agriculture and Fisheries (MGAP), the Minister of Industry, Energy and Mining (MIEM), the holder Office of Planning and Budget (OPP), the Minister of Economy and Finance (MEF) and the Ministry of Education and Culture (MEC), presiding. Also were created two other relevant actors: the National Agency for Research and Innovation (ANII) operational arm of government policies and priorities of the Executive on the subject, and the National Innovation Council of Science and Technology (CONICYT), which was existed but expanded and revitalized as a consultative and advisory body of the system.

Weaknesses:

2.1 Exports: cumulative growth rates below the world average, and high concentration in the leading companies

Exports of the ICT sector do not accompany the dynamism of the global trend, with cumulative growth rates significantly lower than those exhibited by the developed countries. Another factor of concern is related with the degree of concentration in exports. There exists a large dependence of the ICT total exports to the performance of the leading companies; thereby the future capacity of increasing the growth rate of exports of the sector could be compromised

2.2 Telecommunications infrastructure with no enough bandwidth and not competitive cost in relation with the rest of the world:

Ttelecommunications infrastructure is a key factor because the flow of business turned to the outside is increasing and is required to have a better quality in communications, more bandwidth and a cost competitive with rest of the world.

Opportunities:

3.1 Exports: Opportunities for innovative companies

There is an interesting opportunity for the emergence of new enterprises, or for older companies that are able to innovate in the way of selling their products. Innovation comes with a huge potential for companies that are capable of entering into niches creating innovative business models.

3.2 High capacity and speed to select and adopt new Technologies:

High capacity and speed to select and adopt new technologies due to: an open trade to innovative international markets; need to compete abroad for knowledge at competitive prices, and not cheap labor; and balance between "early adopters" and "conservatives of safe passage" (this means that exists a balanced equilibrium between innovation and caution within entrepreneurs).

3.3 Good Laboratory (ability of replicating ICT products to other cultures):

Uruguay proved to be a good laboratory, capable of replicating conforming to other cultures. One of the niches is selling prototype experience.

Threats:

4.1 Shortage in the quantity of human resources in relation to demand:

To maintain the sustainability of the current dynamism is important the availabitilty of human resources. Like all knowledge-based industry and labour intensive, the availability of skilled human resources is a key element in ensuring the market growth. The shortage of skilled labour has begun, giving rise to strong concerns at corporate level.

4.2 R&D associated to the scientific / academic, private and public sectors not enough developed:

Sector Scientific / Academic:

- Few and weak R&D groups in universities, there exist some exceptions
- Poor interaction between academia and the private sector; and, low results and technology transfer
- Lack of basic infrastructure for research
- Extremely low wages in relation to the professional labour market
- Low interaction with other science and technology centers
- Low interaction with international centers of excellence.

Private sector:

- Weak research activity
- Lack of incentives for the development of innovation
- Poor interaction with other R&D centers

Public sector:

- Weak research activity

- Poor interaction with other R&D centers

8.5 Conclusions

ICT sector trends

In relation to Uruguay opportunities in ICT, it can be mentioned the high capacity and speed to select and adopt new technologies. Also, during the last ten years there has been significant progress in penetration of ICT in the population, this is reflected in the increase of Mobile and Internet subscribers.

National ICT policies and instruments associated

Uruguay is undergoing a transformation in its National Innovation System, in 2005 was created the Ministerial Office of Innovation (GMI) that has changed the new institutional design of the Innovation System, consequently is not yet possible to analyze the actual impact of these changes. The current year, was approved the PENCTI (Science, Technology and Innovation National Strategic Plan) and is required some time to analyze their results. The PENCTI is part of the so-called "Uruguay Innovator" that is a proposed reform of public policies aimed at developing the capabilities of the National Innovation System in Uruguay.

The Uruguay Digital Agenda is conducted by AGESIC which depends on the Presidency of the Republic. The agency works with technical autonomy and communicates with the Executive Branch through the Office of Planning and Budget (OPP).

Another instrument developed between 2002 and 2008 was the PDT (Technology Development Program), its instruments and calls have no more validity and the PENCTI is now uncharged of the development in Science, Technology and Innovation.

Strengths, weaknesses, opportunities and threats

The ICT sector is innovative and dynamic and experienced an explosive export growth from the mid-nineties and still continues to grow outward.

There are some sectors focused on domestic market that are in worse relative conditions, not having been subjected to the same conditions. Particularly the case of telecommunications, a sector of vital, consequently it is essential to energize and improve the performance of this sector, accompanying international requirements.

In relation with Uruguay weaknesses, exports cumulative growth rates show a high concentration in the leading companies. In relation to Uruguay threats, it can be mentioned the shortage in the quantity of human resources in relation to demand and problems in research and development.

Uruguay strategic priorities, *future trends and areas of common interest*

Nowadays, Uruguay is recognized for the excellence of their products and services, high flexibility in the understanding of customer needs and design, in Latin America is perceived as a provider of software, but not in the world. To change this situation and look ahead, in the final report on the ICT sector of PENCTI (Science, Technology and Innovation National Strategic Plan) were raised specific actions that can give Uruguay an important opportunity in terms of ICT development.

9 COSTA RICA

9.1 ICT sector overview

Costa Rica is an emerging player in the global ICT market. Approximately twenty-five years ago, the country started paving its way towards technology production.

In the area of services, there is significant potential of growth for domestic firms, especially considering that this sector is a real differentiation in relation to its competitors. In relation to services enabled by ICT, the country has the conditions to obtain maximum benefit from this growing market.

Regarding R&D Costa Rican ICT sector is showing progressive interest, specially promoted by the ICT National Association (CAMTIC) and other stakeholders and new government prospectives. R&D cooperation and implementation of projects still needs to be improved, as in many Latin American countries. Even though, Costa Rica was one of the first countries to be involved in ICT cooperation with Europe since FP6's Solar ICT project.

9.1.1 Key indicators

It is important to remark that the weight of ICT in GDP has been growing significantly during the last ten years. Also, R&D expenditure has almost doubled between the years 2000 and 2009. These two indicators show the great importance given to science and technology and ICT during the last ten years.

Regarding the use of technology by the population, there has been a significant penetration and it is possible to see these through broadband and mobile subscriber's rates.

	2000	**2003**	**2006**	**2009**
1. Country population	3.810.000[48]	4.080.000[49]	4.330.000[50]	4.620.000[51]
2. GDP per capita in U$S[52]	4.185	4.293	5.204	5.631
3. Weight of ICT in GDP[53]	1,32%	1,36%	1,52%	1,69%
Weight in GDP of the following sub-sectors*: • IT components	N/D	N/D	N/D	N/D

[48] Source: www.ricyt.org
[49] Source: www.ricyt.org
[50] Source: www.ricyt.org
[51] Source: Digital Planet, WITSA
[52] Source: Digital Planet, WITSA
[53] Source: Digital Planet, WITSA

• IT equipment • Telecom and multimedia equipment • Telecom services • Computer services and software				
4. % national budget dedicated to ICT	N/D	N/D	6,9%	6,2% [54]
5. Mobile subscribers in total / per 100 inhabitants [55]	N/D	39	56,3	69,5
6. Internet subscribers in total / per 100 inhabitants[56]	N/D	8,5	9,8	18,7
7. Broadband subscribers in total / per 100 inhabitants[57]	N/D	1,6	2,1	4,3
8. Internet penetration in total / per 100 inhabitants	2,33	N/D	3,87	N/D
9. % of businesses with 10 or more employees using the Internet [58]	N/D	N/D	N/D	37%
10. Share of ICT-related occupations in the total economy in selected countries	N/D	N/D	N/D	N/D
11. Telecommunication services revenue in total	N/D	N/D	N/D	N/D
12. Mobile telecommunication services	N/D	N/D	N/D	N/D

[54] 2008
[55] www.micit.go.cr
[56] www.micit.go.cr
[57] www.micit.go.cr
[58] www.inec.go.cr

revenue in total				
13. Telecommunication infrastructure investment in total	N/D	N/D	N/D	N/D
14. Total R&D expenditure (in millions U$S)[59]	61,8	62,5	87,6	N/D
15. ICT-related patents as a percentage of national total	N/D	N/D	N/D	N/D
19. Total number of ICT companies	N/D	N/D	N/D	815[60]

* *The data was gathered from the following sources: World Bank Data, INEC (National Institute of Statistic and Censuses), CAMTIC (Information Technology Chamber of Costa Rica), CONICIT (National Council for Scientific and Technological Research), MICIT (Ministry of Science and Technology), RICYT (Networks of Science and Technology Indicators) and CEPAL (Economic Commission for Latin America and the Caribbean).*

9.2.1 Institutional structure

The main public institutions regarding R&D in ICT are the Presidential Council on Competitiveness and Innovation, the Ministry of National Planning and Economic Policy (MIDEPLAN), the Ministry of Science and Technology (MICIT), the National Council for Scientific and Technological Research (CONICIT) and the Ministry of Environment, Energy and Telecommunications (MINAET).

[59] www.ricyt.org
[60] Source: Camtic & Procomer, 2008.

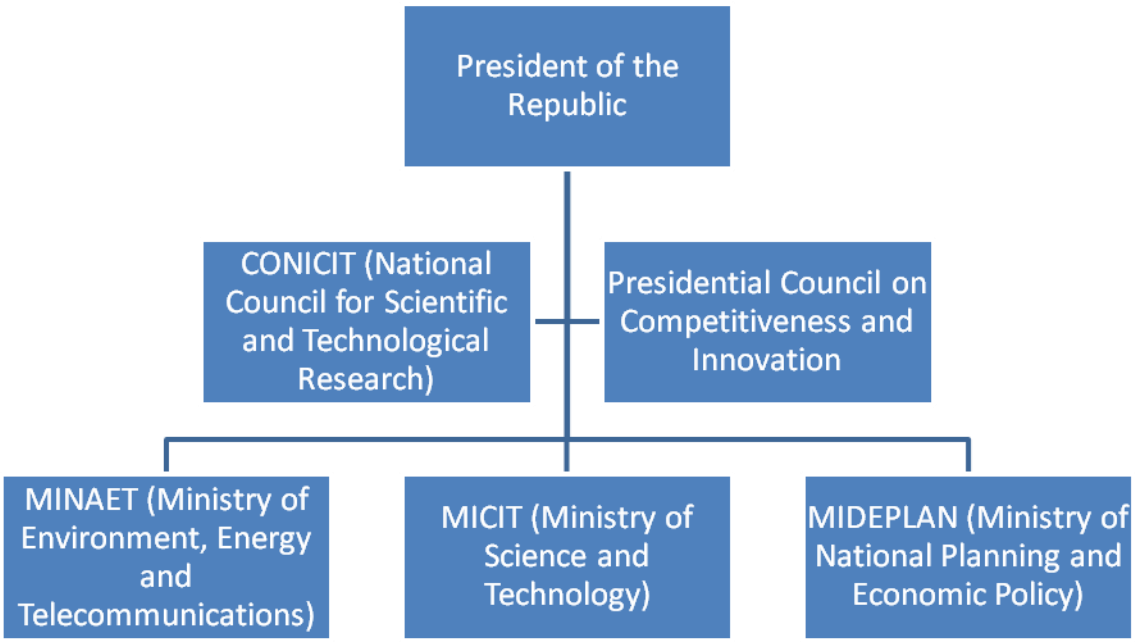

Fig. 10 - Structure and relations of gevernmental organizations with competences in ICT in Costa Rica

The Presidential Council on Competitiveness and Innovation focuses its strategies on the improvement of infrastructure, the simplification of procedures and the promotion of investments. Priority actions are intended to work with human capital and innovation, the use of trade through existing treaties, the attraction of foreign investment, infrastructure development and to conclude in success of the opening of the telecommunications sector.

The Ministry of National Planning and Economic Policy (MIDEPLAN) is the advisory and technical support of the Presidency of the Republic of Costa Rica.

The Ministry of Science and Technology (MICIT) was established in 1986 and its mission is to promote, encourage and stimulate the creation of appropriate conditions for research, innovation, knowledge and technological development of the country and to support economic growth and better quality of life in Costa Rica.

The National Council for Scientific and Technological Research (CONICIT) was established in 1972 as an autonomous institution responsible for channeling and managing funds to the research field (here is included the ICT field). The CONICIT manages internal resources and loans aimed at strengthening local capacities in management of science and technology. This is the main institution regarding the support of R&D activities.

The Ministry of Environment, Energy and Telecommunications (MINAET) aims to contribute to improve the quality of life of the inhabitants of Costa Rica. To this end, the MINAET stewardship in terms of environment, energy and telecommunications, coordinates the participation of other public and private entities in the generation and implementation of policies, strategies and actions aimed at achieving the national and international objectives, and encourages broad participation and responsible for the different sectors of civil society.

9.3 ICT national policies

9.3.1 Evolution and current status of National ICT policies

The most important current National ICT policies are the National Plan of Telecommunications Development, the XXI Century Strategy and The Digital Government Action Plan 2008-2010. The previous policies were the Development National Plan 2006-2010 and the National Plan for Information Technology (2004).

The National Plan of Telecommunications Development, is more restricted compared with the previous policy, the National Development Plan 2006-2010, that included many more areas in addition to ICT (social axis; productive axis; environmental, energetic and telecommunication axis; institutional reform axis and foreign axis).

The National Plan of Telecommunications Development is based on Law N°8642 "General Telecommunications law". The plan goes from 2009 up to 2014 and its main goal in relation to ICT is to guarantee an efficient use of the radio electric capacity for ICT development.

The ministry coordinating the policy is the MINAE (Ministry of Environment, Energy and Telecommunications) and the priority lines of the plan are the telecommunication axis, economic axis, environmental axis and social axis.

The previous policy that involved ICT was the Development National Plan 2006-2010. The ministry coordinating the plan was the MIDEPLAN (Ministry of National Planning and Economic Policy) and the priority lines were the social policy axis; productive policy axis; environmental, energetic and telecommunications policy axis; institutional reform axis; and, foreign policy axis.

In 2004 was launched the National Plan for Information Technology. The design process of the proposal was made by the Information Technology Chamber of Costa Rica (CAMTIC), the International Economic Policy Centre of the National University (CINPE), Centre for Technology and Informatics Management (CEGESTI) and experts from the University of Oslo in Norway. The strategic objectives of the plan are:

1. To foster the right environment for creation and development of sustainable and competitive businesses.
2. To promote and stimulate innovation, IP generation and creation of high value-added business.
3. Integrate and effectively represent the segments that make up the ICT sector.
4. To develop mechanisms for linking business, political, financial and knowledge sectors.
5. To position and support the ICT sector to become a successful global supplier of products an d services.

Also, the Ministry of Science and Technology, supported by the Innovation Directorate, seeks to consolidate the System of Science, Technology and Innovation (SCTI), with the aim of achieving more coordination among academia, government and private sector.

There is also a strategy for long-term development, the. XXI Century Strategy 2004-2050, that seeks to promote the integral development of Costa Rica, through a platform founded on education, science and technology and innovation. The initiative is funded by the Foundation for Cooperation Costa Rica-United States (CR-USA). In 2006, the National Centre for High Technology (CENAT) of the National Council of Rectors

(CONARE) agreed to host the implementation The XXI Century Strategy describes the guidelines towards a solid structure for the development of R&D.

The Digital Government Action Plan 2008-2010, which is carried out by the Digital Government Secretariat, sets out the strategy of development of projects undertaken in various institutions with the support of the Digital Government Secretariat. One ot the strategic objectives of the Action Plan is related with ICT and consists in achieving a significant level of ICT culture and governance in the government sector

9.3.2 Instruments associated and managing organizations

The National Plan of Telecommunications Development has a national scope and addresses the following ICT subsectors: Telecom and multimedia equipment, Telecom services and Computer services and software subsectors. The total budget is between U$S 220 and U$S 260. The budget assigned to the selected sub-sectors is the following:

The main instruments of research policy are FONATEL and SUTEL:

- FONATEL: the National Telecommunications Fund was established on June 4, 2008, by the General Telecommunications law Nº 8642, to ensure universal access and service in the area of telecommunications, after the opening market process of this market. This fund was established with the contribution of an annual percentage of the revenues of the telecommunications sector and will be managed as a trust.
- SUTEL: the Superintendence of Telecommunications is the entity responsible for regulating telecommunications services.

SUTEL, FONATEL (SUTEL dependent) and the Telecommunications Rectory are the instruments and the funding source for meeting the objectives of the plan, below are mentioned the objectives related to ICT:

- To ensure the efficient use of radio spectrum and modern, intelligent, reliable and flexible technologies.
- To ensure modern and smart technologies to guarantee the convergence of networks and services.
- To ensure the use of ICT in the field of public and private management.
- To increase investment in scientific research, technological innovation and ICT production.
- To ensure the potential of ICT to improve environmental, including prevention, mitigation and adaptation of natural resources.
- To ensure an integrated management of waste materials from telecommunications activities.
- To ensure and incorporate the use of ICT in the education system.
- To ensure the digital literacy of the members of the country.
- To ensure the generation of value-added applications with the use of ICT to help develop creativity and skills of the student population.
- To ensure the provision of health services of the country's population through the

intensive application of ICT in services provided by the State in this field.

The budget assigned to FONATEL (National Telecommunications Fund) is between U$S 132 and 156 millions while the budget assigned to SUTEL (Superintendence of Telecommunications) is between U$S 55 and 65 millions. Finally, the budget assigned to the Telecommunications Rectory is between U$S 19 and 23 millions.

The previous ICT policy plan was the National Development Plan 2006-2010, this plan had a national scope and the total budget is U$S 1.560.878.779. The Science and Technology budget between 2007 and 2010 was U$S 19.401.394.

The main instruments of research policy are:

- CONICIT (National Council for Scientific and Technological Research): this council has the following tools to encourage the development of Science and Technology in Costa Rica:
  The Incentive Fund under the Ministry of Science and Technology (which is managed by the CONICIT processes annually applications for postgraduate studies), research projects, attendance at scientific meetings, short courses, intensive training and internships, as well as programs for researchers reintegration.

  Furthermore, through Law 8.262 the ProPymes Fund was established to support companies in incorporating science and technology and innovate in their production methods. These competitive funds are administered by the CONICIT; requests are channeled to address technological needs and services such as metrology, accreditation, certification, standardization, total quality and information.

  With own resources, the CONICIT operates the Risk Research Fund (FORINVES), a non-reimbursable financing mechanism for researchers.
- The Ministry of Science and Technology (MICIT) was established in 1986 and its mission is to promote, encourage and stimulate the creation of appropriate conditions for research, innovation, knowledge and technological development of the country and to support economic growth and better quality of life in Costa Rica.

Regarding international cooperation, the CENIBiot is a cooperative project of science and technology sponsored by the European Union aimed at increasing the competitiveness of agro-industrial sector through the development and application of biotechnology.

It is projected for 60 months (the end date is December 2010), in the first two years will be built and equipped the center. It counts with a total budget of 14,9 million Euros of which 10,9 million are contributed by the European Union and the remaining amount is for national counterpart.

9.3.3 Important policy documents

Document name	**Reference year**	**Short description**	**Coordinating entity**
Plan Nacional de Desarrollo de las Telecomunicaciones 2009-2014	2009	Presentation of the National Plan of Telecommunications	Ministry of Environment, Energy and

National Plan of Telecommunications Development 2009-2014		Development (policy guidelines, objectives, actions and goals).	Telecommunications (MINAET)
Plan Nacional de Desarrollo "Jorge Manuel Dengo Obregón": 2006-2010 *National Development Plan "Jorge Manuel Dengo": 2006-2010*	2007	Presentation of the National Development Plan "Jorge Manuel Dengo": 2006-2010	Ministry of National Planning and Economic Policy (MIDEPLAN)
Programa Nacional de Ciencia y Tecnología 2002-2006 *Science and Technology National Program 2002-2006*	2002	Presentation of the Science and Technology National Program 2002-2006	Ministry of Science and Technology (MICIT)
Costa Rica: verde e inteligente Estrategia Nacional de Tecnologías de Información y Comunicación (incluídas actualizaciones) *Costa Rica: Green and Intelligent* *Information and Communication Technologies National Strategic Plan (including upgrades)*	2004 v0.0 2006 v1.0 2010 v2.0	Presentation of Costa Rica: Green and Intelligent Information and Communication Technologies National Strategic Plan	Information Technology Chamber of Costa Rica (CAMTIC)
Fondo Nacional de Telecomunicaciones (FONATEL) Contexto actual, tendencias	2009	Presentation of FONATEL and explain the use of it's resources	SUTEL (Superintendence of Telecommunications)

clave, opciones y recomendaciones *National Telecommunications Fund (FONATEL) Current context, key trenes, options and recommendations*			

9.4 Main stakeholders of the ICT field

ICT Associations:

There are two major institutions in Costa Rica, CAMTIC and CAATEC. CAMTIC (Chamber of Information Technology and Communication) is integrated by companies linked to major scientific and technological development in ICT field. The original aim of CAMTIC is to form a strategic block to strengthen and support the ICT sector. The High Technology Advisory Commission of Costa Rica (CAATEC), is a private and nonprofit organization that seeks to promote economic and social development by taking advantage of the benefits of information and communication technologies.

Companies of the ICT sector:

In Costa Rica, there is a strong presence of multinational as well as local firms in ICT industry. Some examples are Hospedia, Continental AG, Hewlett Packard, IBM Global, BT, Align Tech, Microsoft, Oracle, Avionics and P & G.

Intel develops programs for primary and secondary education (the "Intel ® Teach for the Future", Centre for Innovation in Learning Technology (CITA), Development of scienfic-technological fairs and Intel Computer Clubhouse) as well as higher education programs (Strengthening curriculum of engineering degrees and fellowships programs). The ICE group (Costa Rica Electricity Institute) plays a key role in developing the ICT sector.

The institute was established in 1949 and has evolved as a state enterprise group, composed of ICE (Electricity and Telecommunications Sectors) and its companies: Radiographic from Costa Rica (RACSA) and National Power and Light Company (CNFL), which have developed various modernization projects developed in recent decades.

Funding agencies:

The National Telecommunications Fund was established on June 4, 2008, by the General Telecommunications law Nº 8642, to ensure universal access and service in the area of telecommunications, after the opening market process. This fund was established with the contribution of an annual percentage of the revenues of the telecommunications sector and will be managed as a trust. Also, the CONICIT (National Council for Scientific and Technological Research) has important tools to encourage the development of Science and Technology in Costa Rica. Finally, FUNDATEC is a non-profit organization linked to the Bahía Blanca Regional Faculty of the National Technological University, whose mission is to assist companies in developing projects that are directed towards improving production and marketing activities, promoting innovations and research and development activities, enabling technology transfer, linking science and technology institutions with the private sector and provide technological assistance.

Higher education institutions:

The most important Higher education institutions related with Science and Technology are the Distance State University (UNED), National University (UNA), Technology Institute from Costa Rica (ITCR), International Polytechnic Institute, Costa Rica Technological University, the CENFOTEC (Information Technology Training Centre) and the Costa Rica University (UCR). The latter has regional offices in order to democratize access to education in different regions of Costa Rica. The CENFOTEC was created in January 2000 by a group of software development

companies and independent investors. Its current activity is concentrated in curriculum design and implementation of programs for training and retraining of professionals in information technology, especially in the software sector.

Research organizations:

Regarding Research organizations, can be highlighted The agenda for the Information Society and Knowledge of the University of Costa Rica (PROSIC) that was established in 2005 to be "a multidisciplinary space, with a central focus in the human being, dedicated to the study, reflection, policy analysis and development activities and projects for greater and better use of information and communication technologies to benefit society.

Other important institutions are FUNDATEC (Costa Rica Technolgy Fundation), Access Fundation and Cooperativa Sulá Batsú Cooperative.

9.5 SWOT analysis of national ICT policies

1. Strengths:	***2. Weaknesses:***	***3. Opportunities:***	***4. Threats:***
1.1. Strong Software and Computer Service sector. 1.2. Highly educated workforce. 1.3. Solid experience and great dynamism in terms of digital government, though still in a nascent state. 1.4. Economic and Social stability. 1.5. Strategic Location.	2.1. Some important factors for ICT development still need to be developed.	3.1. Growing potential for ICT services domestic firms. 3.2. Telecommunications infrastructure: ICE (Electricity Institute from Costa Rica) projects. 3.3. Strong advance regarding internet penetration: Expansion of national ICT market and consciousness of the sector. 3.4 Creation of a long term perspective: "XXI Century Strategy"	4.1. Inequality in ICT access between regions and lack of strong entities participating in R&D activities

		3.5 Increased government interest in education.	

1. Strengths

1.1. Strong Software and Computer Service sector**:**

ICT industry presents a very rich ecosystem with a strong presence of domestic industries, as well as major multinational corporations, which has consolidated a strong ICT industry, especially in the area of Software and Computer Services.

1.2. Highly educated workforce:

National Informatics Education Program og the Ministry of Education and Omar Dengo Fundation (PRONIE MEP-FOD) has promoted the inclusion in Costa Rica since 1988.

1.3. Solid experience and great dynamism in terms of digital government, though still in a nascent state:

From the digital government point of view, there are solid and successful experiences of great dynamism; the technological, legal and institutional advance of the country is significant, and there are observed opportunities to undertake a process of citizen-centered development, with potential to achieve results of short-term impact. Many basis of this eGov project are part of a Digital Strategy called "Costa Rica green and smart" developed by software entities chamber, CAMTIC.

1.4. Economic and Social stability:

The economic, political and social stability of Costa Rica is a major advantage. As a result of this stability, Costa Rica has benefited from good access to global capital markets and an award for moderate "country risk".

1.5. Strategic Location:

Costa Rica has an excellent location because it is in centre of the Americas. Moreover, geographical proximity and greater cultural affinity with the United States, generates cost savings and a more peaceful environment in this market.

2. Weaknesses

2.1. Some important factors for ICT development still need to be developed. Factors that need more development:

- Variety of funding sources beyond credit.
- Capital market development.
- Taking full advantage of special public funds (Fodemipyme) due to access problems.
- Permanent statistics to track the performance of public institutions and enterprises.

3. Opportunities

3.1. Growing potential for ICT services domestic firms:

In the area of services, there is significant potential for growth for domestic firms, especially considering that this branch is a real differentiator over its competition.

3.2. Telecommunications infrastructure: ICE projects

Regarding telecommunications infrastructure, there are in the ICE (Electricity Institute of Costa Rica) projects with a high degree of physical and financial progress, aimed at achieve greater use and extend the capabilities of the country's public telecommunications platform: Internet, fixed telephony and cellular, between others.

3.3. Strong advance regarding internet penetration. Expansion of national ICT market and consciousness of the sector:

Between 2008 and 2010 the total internet connections grew from 218.801 to 325.000 and 85.6% from the total use broadband technology (according to CISCO Barometer 2009). This represents an important increase of the demand of new services and contents by the Costa Rican population.

3.4 Costa Rica is creating a long term perspective which paves the way towards a stronger development path:

The "XXI Century Strategy" is an initiative that includes the main stakeholders from public, academic and private sector in order to discuss and define the main objective for the country in the long term (2050).

3.5 Increased government interest in education.

In May 2010, was approved the Act Amending Article 78 of the Constitution by allocating 8% of GDP on public education.

4. Threats

4.1 Inequality in ICT access between regions and lack of strong entities participating in R&D activities:

There is inequality in ICT access between regions and lack of strong entities participating in R&D activities that makes the development process more fragile to economic turbulences.

9.6 Conclusions

The weight of ICT in GDP has been growing significantly during the last ten years. Also, R&D expenditure has almost doubled between during the last ten years. These two indicators show the great importance given to science and technology and ICT during the last ten years.

From the R+D institutional point of view, the Ministry of Science and Technology plays a key role supported by the Innovation Directorate, as the governing body of public policy in this sector seeks to consolidate the SCTI (Science, Technology and Innovation System), with the aim of achieving greater coordination among the academic, government and business sectors. The MICIT (under the National Development Plan 2006-2010 framework) supports Smart Community Centers (CECIS) located in different parts of the country. These centers help to promote the socio-economic development of all regions of the country through the digital literacy of its users.

The current National ICT policies are the National Plan of Telecommunications Development (focused on the Telecommunications Axis, Economic Axis, Environmental Axis and Social Axis), the XXI Century Strategy and The Digital Government Action Plan 2008-2010. The previous policies were the Development National Plan 2006-2010 and the National Plan for Information Technology.

Within these policies, is important to highlight the Digital Government Action Plan 2008-2010. This action plan presented by the Technical Secretariat of Digital Government (created in 2006). The strategic objectives of the Plan are to achieve a significant level of culture and governance of ICT in the government sector, improve and ensure key government services and processes, promoting the interoperability of processes and procedures of institutions, achieving significant connectivity of the State, significantly improve access and technological culture of citizens, establish mechanisms and procedures for the management of the Secretariat itself have a positive impact on institutions and officials. Also, Certificates Law, Digital Signatures and Electronic were a major step towards ensuring greater reliability in the conduct of electronic transactions in the country.

Regarding Costa Rica's strengths in ICT, it can be highlighted that the country has strong Software and Computer Service sector and a highly educated workforce. Also, Costa Rica has a solid experience and great dynamism in terms of digital government, though still in nascent state. The principal factors facilitating innovation output activities by ICT firms are access to highly skilled workers, entrepreneurial culture, access to loans and information systems, internal training programs, design, market information, fiscal incentives, technology trials, access to technical assistance, and organizational changes. (Source: IDB WORKING PAPER SERIES No. IDB-WP-189).

Most Costa Rican-owned ICT companies have been highly involved in innovations that encompass a wide range of changes in their activities, including product innovations (introducing a new product or service in the market, or improving an existing product or service), organizational innovations, and marketing innovation. Levels of activity in these areas range between 27 % in the case of introducing a new product/service in the international market to 89 percent in the case of improving an existing product or service (Source: IDB WORKING PAPER SERIES No. IDB-WP-189)

In relation to the weaknesses of the country, some activities such as variety of funding sources beyond credit and capital market development, need more development.

Analyzing the opportunities in ICT, Costa Rica is showing a good increase in internet penetration, one of the most important infrastructure indicators and is also developing a well-defined long term perspective: The XXI Century Strategy.

On the other hand, regarding Costa Rica's threats, are the existence of inequality in ICT access between regions and the lack of strong entities participating in R&D activities that makes the development process more fragile to economic turbulences.

ANNEX I – Issues related to the ICT policies analysis in Brazil

Explanation regarding key indicators

1. *Country Population:* Population data based on official publications of the Brazilian Institute of Geography and Statistics (IBGE).
2. *GDP per capita:* GDP data based on official publications of the Brazilian Institute of Geography and Statistics (IBGE).
3. *Weight of ICT in GDP (the relative size of the ICT sector in the economy is measured by its*

value added (VA) over GDP): The information has not been possible to obtain for all years. The 2003 and 2006 data are based on official publications of the Brazilian Institute of Geography and Statistics (IBGE).

4. *Weight in GDP by sub-sectors** IT components, IT equipment, Telecom services, Computer services and software: As in the previous item of information has not been possible to obtain it for the last few years, and in the available studies of sub-classification does not correspond to the requirement (IBGE).

5. *% national budget dedicated to ICT*: The information has not been possible to include in this report because there is no such indication in the official documents published by government and private institutions accredited to deliver this information (IBGE).

6. *Mobile subscribers in total / per 100 inhabitants:* Suscribers mobile data based on official publications of Centre of Research on Information Technology and Communication (CETIC.br).

7. *Internet subscribers in total / per 100 inhabitants* Internet Data based suscribers official publications of World Telecommunication/ICT Indicators Database.

8. *Broadband subscribers in total / per 100 inhabitants* Suscribers broadband data based on official publications of World Telecommunication/ICT Indicators Database.

9. *Internet penetration in total / per 100 inhabitants* Internet penetration data based on official publication of Centre of Research on Information Technology and Communication (CETIC.br).

10. *% of businesses with 10 or more employees using the Internet* Data based on official publication of Centre of Research on Information Technology and Communication (CETIC.br).

11. *Share of ICT-related occupations in the total economy in selected countries* Data based on official publications of the Brazilian Institute of Geography and Statistics (IBGE). Indicators available only for 2003 and 2006.

12. *Telecommunication services revenue in total* The information has not been possible to include in this report because there is no such indication in the official documents published by government and private institutions accredited to deliver this information.

13. *Mobile telecommunication services revenue in total* The information has not been possible to include in this report because there is no such indication in the official documents published by government and private institutions accredited to deliver this information (IBGE and CETIC.br).

14. *Telecommunication infrastructure investment in total* The information has not been possible to include in this report because there is no such indication in the official documents published by government and private institutions accredited to deliver this information (IBGE and CETIC.br).

15. *Gross Domestic Expenditure on R&D – GERD* The requested information has been included

in this report in part, because this indicator was available only for 2007 published by the Ministry of Science and Technology (MCT) and the Secretary of Informatics Policies (SEPIN).

16. *R&D expenditure by sub-sector:* It was not possible to find data specific to these sectors. However, there are R&D expenditures with a different breakdown.
17. *ICT-related patents as a percentage of national total* Data based on OECD.Statistics Extracts and analysis of three institutions: 1) European Patent Organization (EPO); 2) United States Patent and Trademark Office (USPTO); 3) Patent Cooperation Treaty (PCT). Indicators not available for 2009.
18. *Patents by sub-sector:* It was not possible to find data specific to these sectors (OECD.Stat Extracts)
19. *Technology Balance of Payments (TBP)* The information has not been possible to include in this report and that there is no indicator available in studies of ICT Brazilian economy.
20. *Technology balance of payments: Receipts (million current euros)* The information has not been possible to include in this report and that there is no indicator available in studies of ICT Brazilian economy.
21. *Technology balance of payments: Payments (million current euros)* The information has not been possible to include in this report and that there is no indicator available in studies of ICT Brazilian economy.
22. *Total number of ICT companies* The information has not been possible to obtain for all years. The 2003 and 2006 data are based on official publications of the Brazilian Institute of Geography and Statistics (IBGE).
23. *Total number of ICT companies per sub-sector* It was not possible to find data specific to these sectors (IBGE).
24. *Structure and relations of governmental organizations with competences in ICT policies* Data found on Ministry of Science and Technology (MCT) website.

Full list of the main stakeholders of the ICT field

	Entity name	**URL**
ICT associations	Brazilian Association of Information Technology and Communication Companies	*http://www.brasscom.org.br*
	SBC – Brazilian Computer Society	*www.sbc.org.br*

	Digital Port	*http://www.portodigital.org/*
	SBPC – Brazilian Society for Scientific Progress	*www.sbpcnet.org.br/*
	NIC.br - Information and Coordination Nucleus for .BR	*www.nic.br*
	Brazilian Society for Technology Innovation	*http://www.protec.org.br/protec.asp*
Companies of the ICT sector		
Companies by ICT sub-sector: 1. *IT components* 2. *IT equipment* 3. *Telecom services* 4. *Computer services and software* [Computer World]	*1.* *Intel* *AMD* *Furukawa* *Prysmian Telecomunicações* *2.* *IBM Brasil* *Nokia* *HP Brasil* *Samsung* *Motorola Brasil* *LG Eletronics* *Cisco* *Positivo* *Ericsson* *Itautec* *Alcatel-Lucent* *Diebold Procomp* *Epson* *Dell Computers* *STI–SempToshiba*	 *www.Intel.com/br* *www.amd.com/br* *www.furukawa.com.br* *www.prysmian.com.br* *www.ibm.com/br/pt* *www.nokia.com.br* *http://welcome.hp.com/country/br/pt/cs/home.html* *www.samsung.com.br* *www.motorola.com* *br.lge.com* *www.cisco.com/web/br* *www.positivoinformatica.com.br* *www.ericsson.com/br/ericsson/ericsson_brasil/index.shtml* *www.itautec.com.br* *www.alcatel-lucent.com.br* *www.diebold.com/aboutus/operations.htm* *www.epson.com.br* *www.dell.com.br* *www.semptoshiba.com.br*

	EMC	*www.brazil.emc.com*
	Siemens Enterprise Communications	*www.siemens.com.br*
	Lenovo	*www.lenovo.com/br/pt/index.html*
	Lexmark	*www.lexservice.com.br*
	NEC do Brasil	*www.nec.com.br*
	Sony Ericsson	*www.sonyericsson.com/cws/home?lc=pt&cc=br*
	Cobra	*www.cobra.com.br/cobra*
	Sun Microsystems	*www.br.sun.com*
	3Com	*www.3com.com.br*
	Xerox do Brasil	*www.xerox.com/index/ptbr.html*
	Avaya	*www.Avaya.com/br*
	Scopus	*www.scopusbrasil.com.br*
	3.	
	Oi	*www.oi.com.br*
	Telefonica	*www.telefonica.com.br*
	Vivo	*www.vivo.com.br*
	Tim	*www.tim.com.br*
	Embratel	*www.embratel.com.br*
	Claro	*www.claro.com.br*
	GVT	*www.gvt.com.br*
	Contax	*http://www.contax.com.br*
	4.	
	Microsoft	*www.microsoft.com/Brasil*
	Stefanini IT Solutions	*www.stefanini.com.br*
	PromonLogicalis	*www.br.promonlogicalis.com*
	Sun Microsystems	*www.br.sun.com*
	Politec	*www.politec.com.br*
	TOTVS	*www.totvs.com*
	Sonda Procwork	*www.sondaprocwork.com.br*
	Computer Associates	*www.ca.com/br*
	Oracle	*www.oracle.com/br*
	SAP Brasil	

	EDS *Accenture* *TIVIT*	*www.sap.com/brazil/index.epx* *www.edsconnects.com* *www.accenture.com/Countries/Brazil/default.htm* *www.tivit.com.br*
Funding agencies	CNPq FINEP FAPESP	*www.cnpq.br* *www.finep.gov.br* *www.fapesp.br*
Higher education institutions	USP – Universidade de São Paulo UNICAMP – Universidade Estadual de Campinas UNESP – Universidade Estadual Paulista UFSCar – Universidade Federal de São Carlos UFRJ – Universidade Federal do Rio de Janeiro PUC-Rio de Janeiro UnB – Universidade de Brasília UFBA - Universidade Federal da Bahia UFC - Universidade Federal do Ceará UFPE - Universidade Federal de Pernambuco UFPB - Universidade Federal da Paraíba UFMG - Universidade Federal de Minas Gerais UFV - Universidade Federal de Viçosa UNIFEI – Universidade Federal de Itajubá UFPR – Universidade	*www.usp.br* *www.unicamp.br* *www.unesp.br* *www.ufscar.br* *www.ufrj.br* *www.puc-rio.br* *www.unb.br* *www.ufba.br* *www.ufc.br* *www.ufpe.br* *www.ufpb.br* *www.ufmg.br* *www.ufv.br* *www.unifei.edu.br*

	Federal do Paraná UFSC – Universidade Federal de Santa Catarina UFRS – Universidade Federal do Rio Grande do Sul	*www.ufpr.br* *www.ufsc.br* *www.ufrgs.br*
Research organizations (public and private)	CPqD The Universities mentioned above are also the most prominent research institutions in the country.	*www.cpqd.com.br*
Entities participating in R&D projects		
• Entities participating in international R&D	*USP – Universidade de São Paulo* *UNICAMP – Universidade Estadual de Campinas* *UFRJ – Universidade Federal do Rio de Janeiro* *UnB – Universidade de Brasília* *CPqD*	*www.usp.br* *www.unicamp.br* *www.ufrj.br* *www.unb.br* *www.cpqd.com.br*
• Entities participating in national/regional R&D projects, that don't participate in international projects	*UNIP – Universidade Paulista* *USJT – Universidade São Judas Tadeu* *UNESP – Universidade Estadual Paulista* *Universidade Presbiteriana Mackenzie* *Pontifícia Universidade Católica de São Paulo* *IPT - Instituto de*	*www.unip.br* *www.usjt.br* *www.unesp.br* *www.mackenzie.com.br* *www.pucsp.br/npt/p&d.html*

	Pesquisas Tecnológicas *Instituto Mauá de Tecnologia* *Centro Universitário da FEI* *Universidade Federal do ABC*	*www.ipt.br/centros_tecnologicos/CIAM* *www.maua.br* *www.ipei.com.br/compeinfo.htm* *http://posinfo.ufabc.edu.br/index_arquivos/projetos.htm*
Other reference institutions from the research community	*We have been unable to acquire the information.*	

ANNEX II – Issues related to the ICT policies analysis in Colombia

Explanation regarding key indicators

1. - Country Population: Population data based on official publications of National Statistics Administrative Department of Colombia (DANE), in millions. Source in References by item. [1]

2. - GDP per capita: GDP data based on official publications of the Central Bank of Colombia – Banco de la República. Source in References by item. [2]

3. - Weight of ICT in GDP (the relative size of the ICT sector in the economy is measured by its value added (VA) over GDP): The information has not been possible to obtain for ICT, because in Colombia the telecommunication sector is undergoing a period of transition to the consolidation of the Information and Communication Technologies – ICT sector. There is not historical information available.

4. - % national budget dedicated to ICT: For the same reason as in number 3, that in (3), in Colombia the % of national budged for ICT has not been identified. However, the following is the percentage of investment budget in Science and Technology as a share of national investment budget, which is assigned to COLCIENCIAS, the Administrative Department of Science, Technology and Innovation. Source in References by item. [4]

	2000	**2003**	**2006**	**2009**
% national budget dedicated to Science and Technology:	0.38%	0.75%	0.82%	0.72%

5. - Mobile subscribers in total / per 100 inhabitants: Mobile Subscribers data based on official publications of Ministry of Information and Communication Technologies. Source in References by item. [5]

6. - Internet subscribers in total / per 100 inhabitants: Internet Subscribers data based on official publications of Communications Regulation Commission (CRC). Source in References by item. [6]

7. - Broadband subscribers in total / per 100 inhabitants: Internet Subscribers data based on official publications of Communications Regulation Commission (CRC). It is important note that until 2007, broadband subscribers were all those with dedicated connections, with speeds greater that 101 kbps, however, since 2007, according to the Resolution 1740 of 2007, the CRC defined that broadband connections are all those with a downstream speed above 512 kbps. Source in References by item. [7]

8. - Internet penetration in total / per 100 inhabitants Internet data based on official publication of Communications Regulation Commission (CRC) and the penetration is calculated by CINTEL.

Source in References by item. [8]

9. - % of businesses with 10 or more employees using the Internet: Data based on official publication of DANE "Press releases, household ICT indicators, commerce, industry, services and micro-establishments (establishments with 10 or fewer persons employed) 2008". Source in References by item. [9]

10. - Share of ICT-related occupations in the total economy in selected countries: The information is not available the indicated years. However, in 2003 the DANE published the results of a study relating to the measurement of ICT in Colombia in 2001. The following table shows the employed persons related to ICT and trained in its use, by sector. Source in References by item. [10]

	Employed persons 2001		
Sectors	**Total**	**Linked to ICT (%)**	**ICT-enabled (%)**
Manufacturing industry	522.252	19,7	7,4
Commerce	469.152	24,7	11,0
Services	382.220	8,6	3,0
Micro-establishments*	1.113.503	4,5	2,1
Regular formal education	N/A	N/A	N/A
Higher education	N/A	N/A	N/A
State	823.291	24,3	5,6
Household	16.556.987	33,7	N/A

**Establishments with 10 or fewer persons employed*

11. - Telecommunication services revenue in total: For 2000, data is based in official documents published by the Communications Regulation Commission (CRC). For 2003 and 2006, data is based in market documents published by CINTEL, which use the official sources of information related with the Telecommunication sector. Source in References by item. [11] and [12]

12. - Mobile telecommunication services revenue in total: For year 2000, the data is based in official document published by CRC. For the other years, the data correspond to official reports by the Ministry of Information and Communication Technologies. Source in References by item. [13] and [14]

13. - Telecommunication infrastructure investment in total: The data is based in official information published by the National Planning Department (DNP). For 2009, these data is not available yet. Source in References by item. [15]

14. - Gross Domestic Expenditure on R&D – GERD: The data is in millions of dollars and is based in information published by the Observatory of Science and Technology of Colombia (OCyT). These calculations include the expenditure in Firms, Higher education institutions, Government organizations, Research and development centers, Hospitals and clinics, Private non-profit service firms, NGOs and Professional associations. Source in References by item. [16]

15. - ICT-related patents as a percentage of national total: It is not possible to include this information in the report, since ICT patent indicator is not available in Colombia. However, the following is an approximation to ICT patents, with data based on information provided by the

Superintendence of Industry and Commerce (SIC), which manages the National Industrial Property System. This data included: Biotechnology Invention Patent Applications and Electrical Engineering submitted in Colombia over national total of Patent Applications of technique sectors (pharmaceutical chemistry, chemical pure, biotechnology, mechanical engineering, electrical engineering, chemical engineering). Source in References by item. [17]

	2000	2003	2006	2009
ICT-related patents as a percentage of national total	10.3%	10.8%	10.0%	13.0%

16. - Patents by sub-sector: The information has not been possible to obtain, because in Colombia, sub-sectors within ICT have not been officially defined yet.

17. - Technology Balance of Payments (TBP): The data is based on official information published by the Central Bank of Colombia - Banco de la República, which included Communication (Postal and currier, and Telecommunications) and Information & Computer services. Source in References by item. [18]

18. - Total number of ICT companies: The information has not been possible to obtain for ICT because in Colombia this sector is undergoing a consolidation process. The following data related to IT companies, was published in a FEDESOFT study.

	2000	2003	2006	2009
Total number of IT companies	N/A	N/A	2.645	2.814

Currently, the Ministry of Information and Communication Technologies is leading actions to strengthen the industry of information technology in coordination with the changing production program led by the Ministry of Commerce, Industry and Trade. As part of efforts led by the Ministry of ICT, the need for an information system to strengthen the industry and to provide information to policymakers, has been identified. For this reason, there is now a project to consolidate an IT Integrates System. Source in References by item. [19]

Structure of governmental organizations with competences in ICT policies

Ministry of Information and Communication Technologies: Defines and promotes the sector policy on ICT to ensure access, use and adoption by the community, business and government and industry development have an efficient spectrum management.

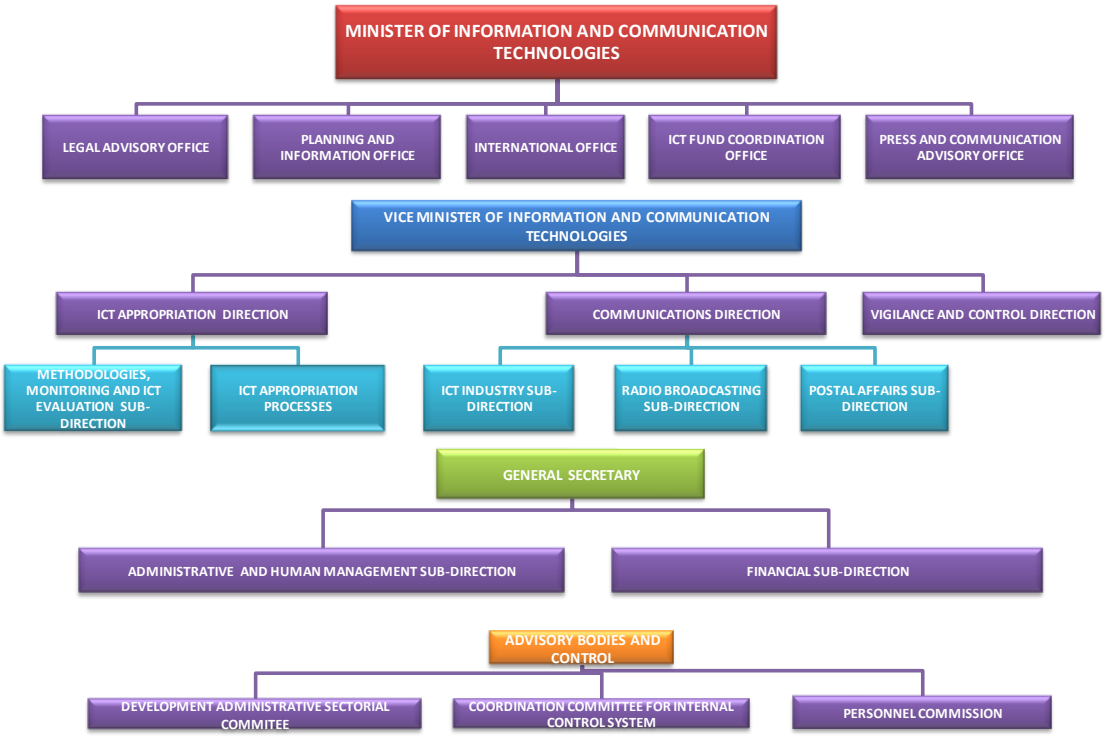

Fig. 11 - Organizational structure of Ministry of ICT

COLCIENCIAS - Administrative Department of Science, Technology and Innovation: promotes public policies to fostering the Science, Technology and Innovation in Colombia. Its activities are focusing in fostering the knowledge production for integral development of the country.

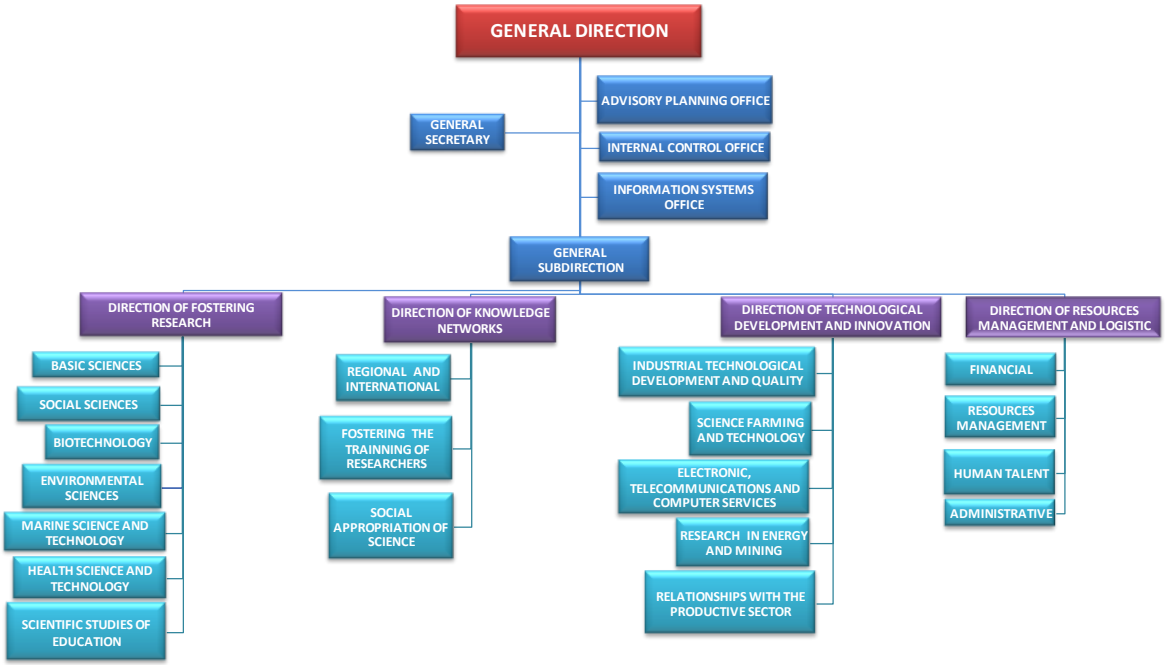

Fig. 12 - Organizational structure of COLCIENCIAS

CRC - Communication Regulation Commission: It is the communications regulator in Colombia, as a mission of promoting competition and investment by building competitive markets, in order to protect users and create conditions that allow connectivity to the population has access to the Information Society.

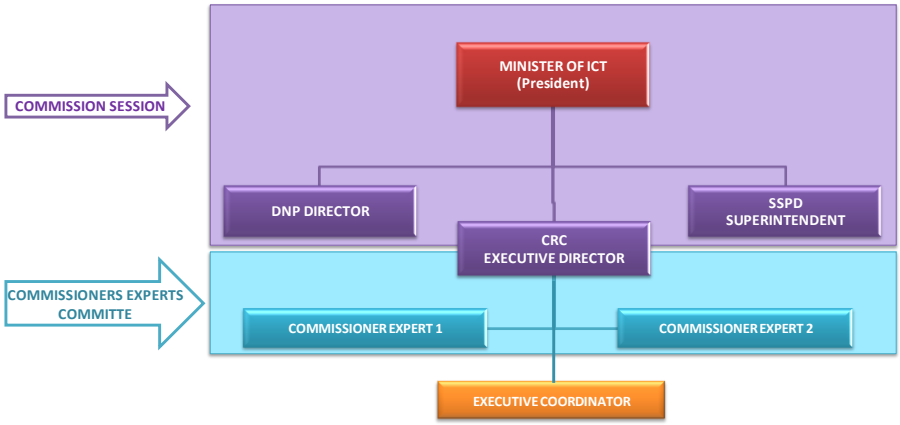

Fig. 13 - Organizational structure of CRC

DNP - National Planning Department: It is a technical advisor to the National Planning Government that is driving a strategic vision for the country, leads and guides the formulation of the National Development Plan and the programming and monitoring of investment resources aimed at achieving the objectives of the medium and long term, directs, develops, monitors, assesses and monitoring policies, plans, programs and projects for economic, social and environmental situation, through a coordinated inter-agency working with national entities and territorial, with sense of responsibility towards the citizenry.

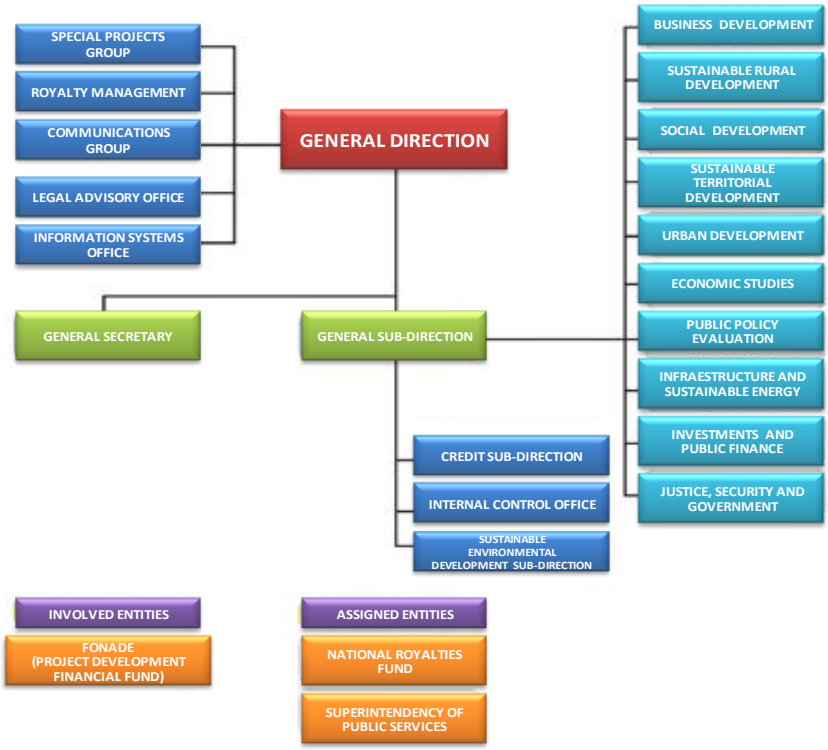

Fig. 14 - Organizational structure of DNP

SIC - Superintendency of Industry and Commerce: The SIC manages the National Industrial Property System and advises the National Government in formulating policies related to industrial property, consumer protection and promotion of competition.

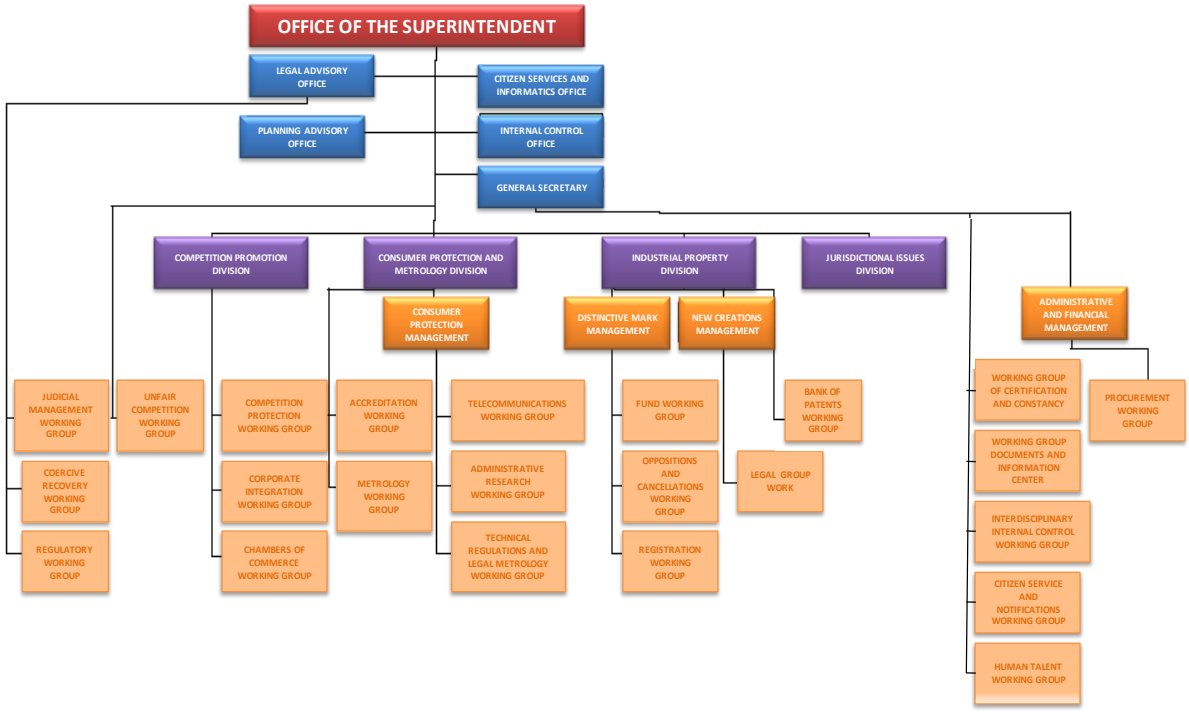

Fig. 15 - Organizational structure of SIC

MEN - Ministry of National Education: The functions and objectives of the MEN is to formulate and establish national education policies, which include the educational use of media and new information technologies and communication in educational institutions to improve the quality of education system and the competitiveness of students nationwide.

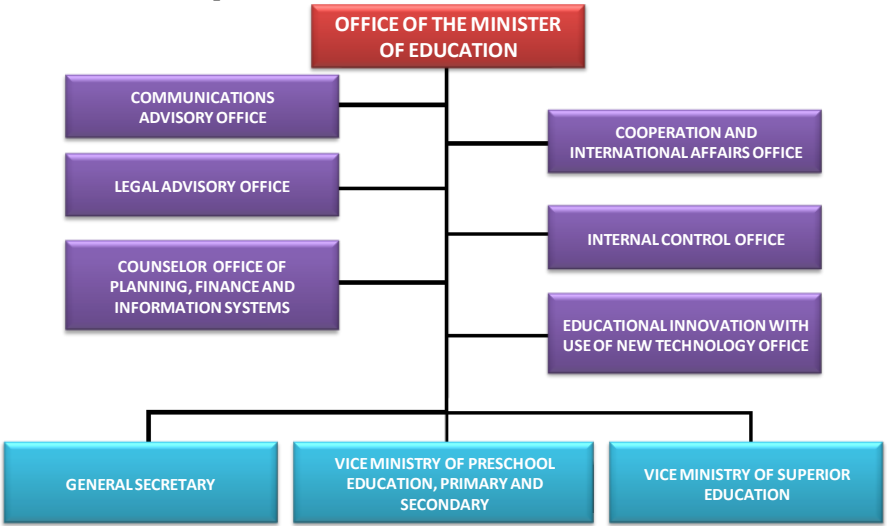

Fig. 16 - Organizational structure of MEN

MCIT - Ministry of Commerce, Industry and Tourism: It has the primary objective within the framework of its competence to formulate, adopt, manage and coordinate overall policies on economic and social development of the country, relating to competitiveness, integration and

development of productive sectors industry, micro, small and medium enterprises, foreign trade in goods, services and technology, promotion of foreign investment, domestic trade and tourism, and execute policies, general plans, programs and foreign trade projects.

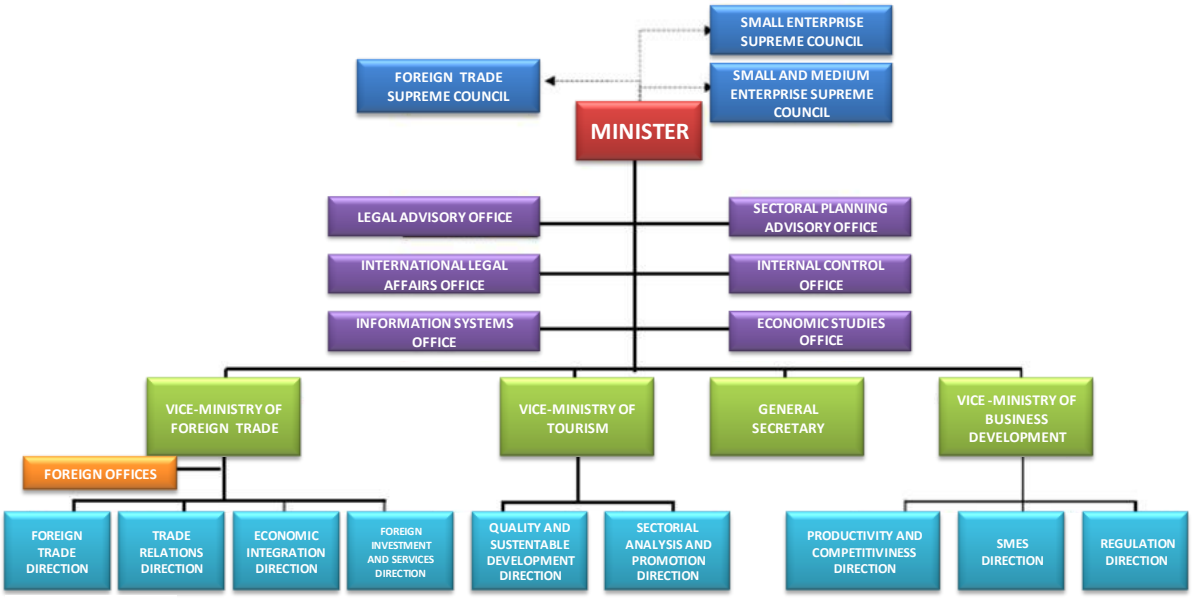

Fig. 17 - Organizational structure of MCIT

Experts contacted

Number	Entity / expert name and position	email	phone
1	COLCIENCIAS www.colciencias.gov.co		
	Osvaldo Castillo Navetty *Programa Nacional de Electrónica, Telecomunicaciones e Informática*	ocastillon@colciencias.gov.co	+571 6258480
	Juan Sebastián Rodríguez *Grupo Internacional*	jsrodriguez@colciencias.gov.co	+571 6258480 Ext 2154
2	DANE www.dane.gov.co		
	Alejandro Hernández	ahernandezb@dane.gov.co	+571 5978300 Ext 2258
3	DNP www.dnp.gov.co		
	Edwin Cristancho *Coordinación de ciencia, Tecnología e Innovación*	ecristancho@dnp.gov.co	+571 3815000
	Humberto Lucero	hlucero@dnp.gov.co	+571 3815000 Ext 1733
4	OCyT http://ocyt.org.co		
	Jorge Lucio Álvarez	jlucio@ocyt.org.co	+ 571 3235059 Ext 109
5	SIC www.sic.gov.co		
	Jorge Arturo Chávez	jchaves@correo.sic.gov.co	+571 5870000 Ext 1097
	Alix Carmenza Céspedes	acespedes@correo.sic.gov.co	+571 5870000 Ext 1095

Full list of the main stakeholders of the ICT field

	Entity name	URL
ICT associations	1 Asociación Colombiana de Contact Centers y BPO	www.acdecc.org
	2 Asociación Colombiana de Empresas de Internet -ASONET-	www.asonet.org
	3 Asociación Colombiana de Especialistas en Derecho Informático y de las Nuevas Tecnologías de la Información y las Comunicaciones -ACODITIC-	http://acoditic.org
	4 Asociación Colombiana de Facultades de Ingeniería -ACOFI-	www.acofi.edu.co
	5 Asociación Colombiana de Ingenieros -ACIEM-	www.aciem.org
	6 Asociación Colombiana de Ingenieros de Sistemas -ACIS-	www.acis.org.co
	7 Asociación Colombiana de Organizaciones no Gubernamentales para la Comunicación Vía Correo Electrónico – COLNODO -	www.colnodo.apc.org
	8 Asociación Colombiana de Usuarios de Internet -ACUI-	www.acui.org.co
	9 Asociación Comunera Distrital de Comités de Desarrollo y Control Social de los Servicios Públicos Domiciliarios y Vocales de Control -ASCOM D.C.-	www.ascomdc.org
	10 Asociación de la Industria Celular en Colombia -ASOCEL-	www.asocel.org.co
	11 Asociación Nacional de Empresas de Servicios Públicos Domiciliarios y Actividades Complementarias e Inherentes - ANDESCO -	www.andesco.com
	12 Asociación Nacional de Medios de Comunicación-ASOMEDIOS	www.asomedios.com
	13 Cámara Colombiana de Informática y Telecomunicaciones- CCIT-	www.ccit.org.co
	14 Corporación Red de Instituciones de Educación, Investigación y Desarrollo del Oriente Colombiano -UNIRED-	www.unired.edu.co
	16 Federación Colombiana de la Industria de Software y Tecnologías Informativas Relacionadas -FEDESOFT-	www.fedesoft.org
	17 IEEE Colombia	www.ieee.org.co
Companies of the ICT sector		
IT components	1 Anditel S.A.	/www.anditel.com.co

	2	Anpala	http://anpala.com.co
	3	Bismark	www.bismark.net.co
	4	BT Latam Colombia	www.globalservices.bt.com/globalLocation.do?method=VIEW&country=co
	5	Comnet	www.comnet.com.co
	6	Computec S.A.	www.computec.com
	7	Control y Sistemas Ltda.	http://controlysistemas.com/
	8	Daxa Colombia	www.daxa.com.co
	9	Disonex	www.disonex.com
	10	Dyetron	www.dyetron.com
	11	HomeDATA	www.homedata.com.co
	12	Información y Tecnología S.A.	www.it.com.co
	13	Multisoft	www.multisoft.com.co
	14	Multitel	http://multitel.com.co
	15	Nec de Colombia S.A.	www.nec.com.co
	16	New Net S.A.	www.newnetsa.com
	17	Nexsy	www.nexsysla.com
	18	OSP International CALA	www.ospinternational.com
	19	Proxel Colombia	www.proxelcolombia.com
	20	Rodrigo Aristizabal y Cía. Ltda. - RAYCO Ltda.	www.rayco.com.co
	21	Telemediciones	www.telemediciones.com
	22	Unicom Ltda.	www.unicom.com.co
	23	Vitacom	www.vitacom.com.co
	24	VoIPCol	www.voipcol.com
	25	Voxcom	www.voxcom.com.co
IT equipment	1	Angelcom	www.angelcom.com.co
	2	Cisco	www.cisco.com/co/index.shtml
	3	Dell Colombia	http://dell.com.co
	4	Hewlett-Packard Colombia	http://welcome.hp.com/country/co/es/welcome.html#Product
	5	Huawei	http://www.huawei.com/es/catalog.do?id=325
	6	IBM Colombia	www.ibm.com/co/es/
	7	Ingenerios Asociados Contratistas S.A. - Ingacon	www.ingacon.com
	8	Melexa	www.melexa.com
	9	Metricom	www.metricom.com.co
	10	Siemens	ttp://w1.siemens.com/answers/co/es/
	11	Sony Ericsson Colombia	www.sonyericsson.com/cws/home?lc=es&cc=co
Telecom services	1	Avantel	www.avantel.com.co
	2	Alfasurt TV Cable Ltda.	www.alfasurt.com

	3	Axesat	www.axesat.com
	4	Cable Bello Televisión	www.cablebellotv.com.co
	5	Cable Cauca	http://cablecauca.com
	6	Cable Express de Colombia Limitada	cexpress@epm.net.co
	7	Cable Unión S.A.	www.cableunion.com.co
	8	Caucatel	www.caucatel.com.co
	9	Codisert Ltda.	www.codisert.net.co
	10	Colomsat	www.colomsat.net.co
	11	Comcel	www.comcel.com.co
	12	Costatel	http://costatel.com/
	13	Dcs Digital Communication Systems	www.dcsdigital.com
	14	DirecTV Colombia Ltda	www.directv.com.co
	15	Edatel	www.edatel.net.co
	16	Empresa de Recursos Tecnológicos - ERT	www.ert.com.co
	17	Empresa de Telecomunicaciones de Bogota - ETB	www.etb.com.co
	18	Empresa de Telecomunicaciones de Bucaramanga - Telebucaramanga S.A. ESP	www.telebucaramanga.com.co
	19	Empresas Municipales de Cali - EMCALI E.I.C.E	www.emcali.com.co
	20	Emtel	www.emtel.net.co
	21	Ericsson de Colombia	http://www.ericsson.com/ericsson/worldwide/columbia.shtml
	22	Escarsa	www.escarsa.net.co
	23	Ifx Networks Colombia	www.ifxnetworks.com
	24	Infonet Enterprise	www.infonetenterprise.com.co
	25	Intelligent Technology Solutions	www.its.net.co
	26	Internexa	www.internexa.com.co
	27	Metrotel	www.metrotel.net.co
	28	Movistar	www.movistar.com.co
	29	Red Uno	www.reduno.com.co
	30	S3 Wireless Colombia	www.s3.com.co
	31	Super Cable Comunicaciones S.A.	www.supercabletv.net.co
	32	Telefonica de Pereira S.A. ESP	www.etp.com.co
	33	Telefónica Telecom	www.telefonica.com.co
	34	Teleorinoquia	http://teleorinoquia.net.co
	35	Telmex	www.telmexhogar.com.co
	36	Tigo	www.tigo.com.co

	37	Tv Cable San Gil Limitada	http://tvcablesangil.com
	38	TV Satélite Arauca	www.tvsatelite.com.co
	39	UNE - EPM Telecomunicaciones S.A ESP	www.une.com.co
	40	Unitel	www.unitel.com.co
	41	Visión Satelite S.A.	www.visionsatelite.com
Computer services and software	1	2kinse	www.2kinse.com
	2	A.J. Telecomunicaciones	www.ajscomunicaciones.com
	3	Alianza y dirección en valores -ADV-	www.adv.com.co
	4	Assenda	www.assenda.com
	5	Avansoft	www.avansoft.com
	6	Calipso Comunicaciones S.A.	www.calipso.com.co
	7	Ceiba Software House	www.ceiba.com.co
	8	Colombia Games	www.colombiagames.com
	9	Comware	www.comware.com.co
	10	Digiware de Colombia	www.digiware.com.co
	11	Gestiontek	www.gestiontek.com
	12	Git Ltda.	www.gitltda.com
	13	Global Technology Services - GTS Colombia	www.gtscolombia.com
	14	Inprel	www.inprel.com
	15	Mapas y Datos	www.mapasydatos.com
	16	Microsoft Colombia	www.microsoft.com/colombia/
	17	Natura Software	www.naturasoftware.com
	18	Oracle	www.oracle.com/global/lad/index.html
	19	Phidias Software	www.phidias.com.co
	20	Pixel Group	www.pixelgroup.net
	21	Pro Cibernética	www.pro-cibernetica.com.co
	22	Procalculo Prosis	www.procalculoprosis.com
	23	PSL	www.psl.com.co/
Funding agencies	1	BANCOLDEX	www.bancoldex.com
	2	Cámara de Comercio de Bogotá - CCB	www.ccb.org.co

	3	COLCIENCIAS	www.COLCIENCIAS.gov.co
	4	Corporación TECNNOVA Universidad, Empresa, Estado	www.tecnnova.org
	5	FOMIPYME	www.mincomercio.gov.co/eContent/newsdetail.asp?id=4556
	6	FONADE	www.fonade.gov.co
	7	Fondo de Tecnologías de la Información y las Comunicaciones - FONTIC	www.mintic.gov.co/mincom/faces/index.jsp?id=2668
	8	Fondo Nacional de Garantías -FNG	www.fng.gov.co
	9	Fondo Nacional de Productividad y Competitividad – FNPC	www.mincomercio.gov.co/eContent/NewsDetail.asp?ID=304&IDCompany=20
	10	SENA	www.sena.edu.co
Higher education institutions	1	Escuela Colombiana de Ingenieria -JULIO GARAVITO	www.escuelaing.edu.co
	2	Escuela Naval de Suboficiales ARC Barranquilla	www.escuelanavalsuboficiales.edu.co/
	3	Fundación Universidad del Norte	www.uninorte.edu.co
	4	Politecnico Grancolombiano	www.poligran.edu.co
	5	Pontificia Universidad Javeriana -PUJ	www.javeriana.edu.co
	6	Universidad Antonio Nariño	www.uan.edu.co
	7	Universidad Autónoma de Bucaramanga -UNAB	www.unab.edu.co
	8	Universidad Autónoma de Occidente	www.uao.edu.co
	9	Universidad de Antioquia	www.uao.edu.co
	10	Universidad de Caldas	www.ucaldas.edu.co
	11	Universidad de la Sabana	www.unisabana.edu.co
	12	Universidad de la Salle	www.unisalle.lasalle.edu.co
	13	Universidad de Los Andes -UNIANDES	www.uniandes.edu.co
	14	Universidad de Medellín	www.udem.edu.co
	15	Universidad de Santander -UDES	www.udes.edu.co
	16	Universidad del Cauca -UNICAUCA	www.unicauca.edu.co
	17	Universidad del Norte	www.uninorte.edu.co

	18	Universidad del Valle - UNIVALLE	www.univalle.edu.co
	19	Universidad Distrital Francisco Jose de Caldas	www.udistrital.edu.co
	20	Universidad EAFIT	www.eafit.edu.co
	21	Universidad EAN	www.ean.edu.co
	22	Universidad Externado de Colombia	www.uexternado.edu.co
	23	Universidad ICESI	www.icesi.edu.co
	24	Universidad Industrial de Santander -UIS	www.uis.edu.co
	25	Universidad Manuela Beltrán -UMB	www.umb.edu.co
	26	Universidad Nacional de Colombia	www.unal.edu.co
	27	Universidad Nuestra Señora del Rosario	www.urosario.edu.co
	28	Universidad Pontificia Bolivariana	www.upb.edu.co
	29	Universidad Pontificia de Bucaramanga -UPB	www.upbbga.edu.co
	30	Universidad Santo Tomas - USTA	www.usta.edu.co
	31	Universidad Sergio Arboleda	www.usergioarboleda.edu.co
	32	Universidad Tecnológica de Pereira	www.utp.edu.co
Research organizations (public and private)	1	Centro de Ciencia y Tecnología de Antioquia - CTA -	www.cta.org.co
	2	Centro de Investigación de las Telecomunicaciones - CINTEL-	www.CINTEL.org.co
	3	Centro de Investigación y Desarrollo Tecnológico del Sector Eléctrico - CIDET -	www.cidet.com.co
	4	Centro Empresarial de Servicios Integrales	www.creame.com.co
	5	Corporación Eco-eficiente - ECO -	www.corpoeco.org
	6	Corporación Incubadora de empresas de Base Tecnológica del Oriente Antioqueño – Génesis	www.incubadoragenesis.com
	7	Departamento Administrativo de Ciencia, Tecnología e Innovación - COLCIENCIAS -	www.COLCIENCIAS.gov.co
	8	Fundación Parque Tecnológico del Software - Parquesoft -	www.parquesoft.com
	9	Grupo de Investigación Conocimiento, Innovación y Competitividad - CINNCO	www.javeriana.edu.co/fcea/area_administracion/investigacion_admon.htm
	10	Grupo de Investigación en Electrónica, Telemática, Arquitectura del Computador y Temas afines	www.unbosque.edu.co

	11 Grupo de Investigación en Ingeniería de Software EIA - GIISEIA -	www.eia.edu.co/sitios/webprofesores/giiseia/index.html
	12 Grupo de Investigación en Microelectrónica	www.upb.edu.co/microelectronica
	13 Grupo de Investigación en Sistemas de Telecomunicaciones - SISTEL-UV -	http://sistel-uv.univalle.edu.co
	14 Grupo de Investigación en Telecomunicaciones - SISCOM -	http://puj-portal.javeriana.edu.co/portal/page/portal/Facultad%20de%20Ingenieria/1pdf_depto_electronica/CEPIT%20pdf.pdf
	15 Grupo de Investigación y Desarrollo en Telecomunicaciones -G.I.D.T.-	http://bari.ufps.edu.co/gidt
	16 Grupo de Microelectrónica de la Universidad Nacional de Colombia - GMUN -	http://gmun.unal.edu.co
	17 Grupo I+D en Tecnologías de la Información	www.gti.unicauca.edu.co
	18 Incubadora de Empresas de Base Tecnológica de Manizales	www.incubar.org
	19 Incubar Huila	http://incubarhuila.org
	20 Observatorio colombiano de Ciencia y Tecnología - OCyT	www.ocyt.org.co
	21 Parque Tecnológico de Antioquia S.A. - PTA -	www.parquepta.org
	22 Parque Tecnológico de Guatiguará	www.uis.edu.co/portal/investigacion/guatiguara/main.html
	23 Red de tecnología avanzada - RENATA	www.renata.edu.co
	24 Servicio Nacional de Aprendizaje - SENA	www.sena.edu.co
	25 Sistemas de Telecomunicaciones	http://is.umb.edu.co/gritec
Entities participating in R&D projects		
Entities participating in international R&D projects	1 Asogravas	www.asogravas.org
	2 Avantel	www.avantel.com
	3 Cidetexco	www.textil-confeccion.com.co
	4 CINTEL	www.CINTEL.org.co
	5 COLCIENCIAS	www.COLCIENCIAS.org.co
	6 Coralina	www.coralina.gov.co
	7 Cromasoft S.A.	www.cromasoft.com
	8 Escuela Colombiana de Ingenieria -JULIO GARAVITO	www.escuelaing.edu.co
	9 Fedesoft	www.fedesoft.org
	10 Fundación Centro Colombiano de Hipoterapia	www.hipoterapia.com
	11 Pontificia Universidad Javeriana	www.javeriana.edu.co
	12 Productos Químicos Andinos S.A.	www.pqa.com.co
	13 SENA	www.sena.edu.co
	14 Servibanca S.A.	www.servibanca.com.

		co
	15 Sistema Integrado de Transporte SI 99 S.A.	www.si99.com.co
	16 Universidad Antonio Nariño	www.uan.edu.co
	17 Universidad de Antioquia	www.uao.edu.co
	18 Universidad de La Sabana	www.unisabana.edu.co
	19 Universidad de Los Andes	www.uniandes.edu.co
	20 Universidad de Medellín	www.udem.edu.co
	21 Universidad del Cauca -UNICAUCA	www.unicauca.edu.co
	22 Universidad del Norte	www.uninorte.edu.co
	23 Universidad Nacional de Colombia	www.unal.edu.co
	24 Web Studio E-Solutions	www.ebstudio.com
Entities participating in national/regional R&D projects, that don't participate in international projects	1 Colciencias	www.colciencias.org.co
	2 Centro de Ciencia y Tecnología de Antioquia - CTA -	www.cta.org.co
	3 Centro de Investigación y Desarrollo Tecnológico del Sector Eléctrico - CIDET -	www.cidet.com.co
	4 Grupo de Investigación en Electrónica, Telemática, Arquitectura del Computador y Temas afines	www.unbosque.edu.co
	5 Grupo de Investigación en Ingeniería de Software EIA - GIISEIA -	www.eia.edu.co/sitios/webprofesores/giiseia/index.html
	6 Grupo de Investigación en Microelectrónica	www.upb.edu.co/microelectronica
	7 Grupo de Investigación en Sistemas de Telecomunicaciones - SISTEL-UV -	http://sistel-uv.univalle.edu.co
	8 Grupo de Investigación en Telecomunicaciones - SISCOM -	http://puj-portal.javeriana.edu.co/portal/page/portal/Facultad%20de%20Ingenieria/1pdf_depto_electronica/CEPIT%20pdf.pdf
	9 Grupo de Investigación y Desarrollo en Telecomunicaciones -G.I.D.T.-	http://bari.ufps.edu.co/gidt
	10 Grupo de Microelectrónica de la Universidad Nacional de Colombia - GMUN -	http://gmun.unal.edu.co
	11 Grupo I+D en Tecnologías de la Información	www.gti.unicauca.edu.co
	12 Incubadora de Empresas de Base Tecnologica de Manizales	www.incubar.org
	13 Incubar Huila	http://incubarhuila.org
	14 Parque Tecnológico de Antioquia S.A. - PTA -	www.parquepta.org
	15 Parque Tecnológico de Guatiguará	www.uis.edu.co/portal/investigacion/guatiguara/main.html
	16 Red de tecnología avanzada - RENATA	www.renata.edu.co
	17 Servicio Nacional de Aprendizaje - SENA	www.sena.edu.co
Other reference institutions from the research community	N/A	

ANNEX III – Issues related to the ICT policies analysis in Chile

Explanation regarding key indicators

During the information survey we faced two problems somehow related with the same conceptual issue: the way the information is classified and the level of conceptual standardization adopted or not in Chile regarding ICTs. In general, the pervasive use and consideration of ICTs as an intermediate tool useful in a lot of fields rather than a R&D object itself makes most ICT developments to be seen as a "transversal matter" and therefore many information sources and databases do not provide a separated observation of the ICT dimension/phenomenon involved in each field of interest reported. In addition, when the template requires the general ICT information to be disaggregated into four sub-sectors (IT Components, IT Equipment, Telecom Services and Computer Services and Software) another problem arises: the information databases in Chile have not been constructed accordingly with this sub-classification (taken from reports of the Joint Research Centre / Institute for Prospective Technological Studies).

Regarding indicators 18 and 19, although we observe a general increment in the number of patents related to ICTs from 6.99% in 2000 to 12.84% in 2006 it is relevant to mention that only a 9% in average over the total number of patents for this period were conceded to chileans/residents. The remaining 91% of patents are held by transnational or external groups, individuals or companies from other countries. To complement the relative percentages given in table, it may also be necessary to consider the absolute number of patents granted in Chile each year. In particular, in 2003 the INAPI reports a total of only 297 patents granted while for the rest of the years of the period 2000-2006 (excluding 2003) the average total number of patents per year is 685. Anyway, if we consider the top percentages of the period we find just 12.84% of ICT related patents in 2006 (from a total of 736), which gives 81 patents where only 13 (16%) were granted for national holders.

This particular survey for indicators in the field of rights protection over technological creations, has led us to a relevant consideration: Besides ICT related patents, it would have been very important to include also **intellectual property** indicators in our survey. This is because, at least in Chile, the **software** is deemed a sort of "literary creation" and therefore its protection must be registered in the Department of Intellectual Rights (DDI) and not in the National Institute of Industrial Property (INAPI) which has been used as data source for the information about patenting in this survey. The weight of software development and other related services over the ICT related commercial activities is very relevant in the case of countries that, like the case of Chile, develop more technological related services than hardware and equipment manufacturing.

This last consideration is rather logic since, along with the arrival of the Knowledge Society the Intellectual Property Rights have grown in importance with respect to Industrial Property patents.

On one hand, the complexity, economic cost, and slowness of the patenting process for an industrial invention, product or utility model plays against the dynamics of technological evolution and market penetration so that an invention can become obsolete before the patent has reached its total validation. Moreover, normally while the first prototypes are submitted for patenting the developers are still away from the final commercial product. On the other hand, registering intellectual rights is easier, cheaper, and it has an immediate effect in a whole community of countries through the international treaties that are administrated by the World Intellectual Property Organization (WIPO). Additionally, the intellectual property has a long life validity for the creator and this validity is extended 70 years after creator's death. Currently, the technological added value resulting from the research and development is more conceptual than its physical realization.

Regarding indicators 7 to 10 (Mobile subscribers and Internet/broadband penetration): Chile clearly has experienced an explosive increment in the number of mobile subscribers in the last ten years.

According to the information provided by companies to the Under Secretariat of Telecommunications (SUBTEL), by march of 2010 the market of cellular telephony in Chile exhibits the following percentages of participation between the main actors: CLARO (20,7%), ENTEL (37,49%) , MOVISTAR (41,71%), NEXTEL (0,09%). This last is a new participant that is beginning its market penetration campaign this year but its main activity is Radio Trunking Mobile Telephony which is not a conventional cellular system.

According to the published statistics, in December 2009 Chile had 16.450.223 active subscriptions which over 16.928.873 country population gives a 97,1% of penetration per 100 inhabitants. By march 2010, SUBTEL reports 17.078.532 active subscriber terminals in Chile which means a 100,15 % of penetration of mobile subscribers per 100 inhabitants and a 374,07% of penetrations in households. The average annual growing of subscribers between 2001 and 2009 was 19,71% where the highest percentage was registered in 2001 with a surprising 49,96%.

Prepaid credit versus contracted plans: Along the observed period the two main contractual systems offered by cell companies exhibit an irregular behaviour in terms of their preponderance in mutual detriment. There is no remarkable trend in what the population prefers and it is because such trends are highly determined by the dynamic and aggressive marketing strategies carried out by the providers.

Concerning Internet access, in the observed period there is a clear decrement in the number of commuted Internet accesses. From a total of 577.809 connections in 2000 this kind of access diminished ten times reaching only 5.776 in 2009. In contrast, the dedicated connections (broadband) raised 217 times from 7680 in 2000 to 1.666.054 by 2009.

According to the latest State of Internet Report (SOI) presented recently in Chile, in 2009 Latin America was the world region that exhibited the highest increment in the use of Internet with a 23% of growth. However, this region represents only the 8% of the global Internet audience. In this context, Chile is below this average with a 16% of growth of dedicated broadband connections which is the lowest rate in the region whose two firs places correspond to Colombia and Argentina (36% and 28% of growth respectively). The main use of the web for Chilean users

is social networking, e-commerce and e-mail.

Finally, it is remarkable that between the years 2000 to 2009, defined for this information survey, Chile was under the administration of successive governments that exhibited a political continuity since all of the elected Presidents of this period where affiliated to the same coalition of parties (Concert of Parties for Democracy). Now, in march 2010, a new government with different political orientation has assumed with the election of the new President.

1.- Country Population: Population data based on official publications of National Institute of Statistics. Source in References by ítem.[1] [2]

2.- GDP per capita: GDP data based on official publications of the Central Bank of Chile and the Budget Office of the Nation. Source in References by ítem. [3] [4] [5]

3.- Weight of ICT in GDP (the relative size of the ICT sector in the economy is measured by its value added (VA) over GDP): The information has not been possible to obtain it for the last few years, as in Chile are very few studies of analysis and economic impact of ICTs. Yes we have accessed data on as "value-added ICT" Document Satellite Account of Information and Communication Technologies in Chile [6], only for the years 2000 and 2003. This is the only study that has yielded concrete data of the contribution of ICTs in the national economy. In this study we define "value added ICT" as: *"the impact of ICT in the national economy, and is constructed from the value added associated with ICT production is generated by the characteristic activities and ICT features. Companies classified as ICT characteristic activities are those whose main productions are ICT goods and services."*

*4.- Weight in GDP by sub-sectors** IT components, IT equipment, Telecom services, Computer services and software: As in the previous item of information has not been possible to obtain it for the last few years, and in the available studies of sub-classification does not correspond to the requirement. In fact, in Chile there are no declared sub-sectors in the ICT area over which measurements are made. Each study defines its own classification of analysis.
The closest information as requested has been obtained from studying satellite account [6], conducted by the Ministry of Economy where there are only indicators for the years 2000 and 2003 and referred to in sub sectors: Telecommunications, IT Services, Trade ICT, ICT Manufacturing, Manufacturing Industry, and Education.

Weight in GDP of the following sub-sectors*:	2000	2003	2006	2009
• Telecommunications	616.502	908.886	N/D	N/D
• IT services	309.675	368.107	N/D	N/D

• Trade ICT	117.900	170.324	N/D	N/D
• Manufacturing ICT	19.951	21.508	N/D	N/D
• Manufacturing Industry	238	261	N/D	N/D
• Education	21.458	28.027	N/D	N/D

* Numbers in millions of Chilean Pesos (local currency)

* Source of document in General References.

5.- % national budget dedicated to ICT: The information has not been possible to include in this report because there is no such indication in the official documents published by government and private institutions accredited to deliver this information.

6.- % national budget dedicated by sub-sectors: The information has not been possible to include in this report because there is no such indication in the official documents published by government and private institutions accredited to deliver this information.

7.- Mobile subscribers in total / per 100 inhabitants: Suscribers mobile data based on official publications of Department of Telecommunications (Subtel) and published in Dinamic Tables Digital Strategy ICT Centre, Ministry of Economy. Source in References by item. [7]

8.- Internet subscribers in total / per 100 inhabitants Internet Data based suscribers official publications of Department of Telecommunications (Subtel) and published in Dinamic Tables Digital Strategy ICT Centre, Ministry of Economy. Source in References by item. [8]

9.- Broadband subscribers in total / per 100 inhabitants Suscribers broadband data based on official publications of Department of Telecommunications (Subtel) and published in Dinamic Tables Digital Strategy ICT Centre, Ministry of Economy. Source in References by item. [9]

10.- Internet penetration in total / per 100 inhabitants Internet penetration data based on official publication of Secretariat for the Economy "Access and Use of Information and Communication Technologies in the Chilean Companies" and published in Dinamic Tables Digital Strategy ICT Centre, Ministry of Economy. Source in References by item. [10]

11.- % of businesses with 10 or more employees using the Internet Data based on official publication of Secretariat for Economy "Access and Use of Information and Communication Technologies in the Chilean Companies" and published in Dinamic Tables Digital Strategy ICT Centre, Ministry of Economy. Source in References by item. [11] [12]

12.- Share of ICT-related occupations in the total economy in selected countries Data based on publication "National Study on Information Technology" of CETIUC, Catholic University of Chile and published in PivotTables Digital Strategy ICT Centre, Ministry of Economy. Indicators available only for 2009. Source in References by item. [13]

13.- Telecommunication services revenue in total The information has not been possible to include in this report because there is no such indication in the official documents published by government and private institutions accredited to deliver this information.

14.- Mobile telecommunication services revenue in total The information has not been possible to include in this report because there is no such indication in the official documents published by government and private institutions accredited to deliver this information.

15.- Telecommunication infrastructure investment in total The information has not been possible to include in this report because there is no such indication in the official documents published by government and private institutions accredited to deliver this information.

16.- Gross Domestic Expenditure on R&D – GERD The requested information has been included in this report in part, because this indicator was available only for 2003 in the official documents published by government and private institutions accredited to deliver this information. The data was based on information available at the website of the National Commission on Science and Technology (CONICYT). Source in References by item. [15]

17.- R&D expenditure by sub-sector: The information has not been possible to include in this report because there is no such indication in the official documents published by government and private institutions accredited to deliver this information.

18.- ICT-related patents as a percentage of national total Data based on computer analysis by FORESTA UTEM, as this information is not available in the Industrial Property Department (DPI), an institution in charge of registering patents in Chile. To determine the percentages of the sector was necessary to review one by one the titles of patents granted in 2000, 2003 and 2006 and determine, according to the description provided by the title of each patent, if this is part of ICT. See Appendix nº 1.

19.- Patents by sub-sector: Data based on computer analysis by FORESTA UTEM, as this information is not available in the Industrial Property Department (DPI), an institution in charge of registering patents in Chile. To determine the percentages by subsector was necessary to review one by one the titles of patents granted in 2000, 2003 and 2006 and determine, according to the description provided by the title of each patent, which belonged to each subsector. [17] See Appendix 1.

20, 21, 22.- Technology Balance of Payments (TBP) The most similar information we could found was a relation of exports and imports in "Computer, communications and other services" provided by the World Bank (http://econ.worldbank.org). To access the detailed research database of indicators it is necessary to be registered and pay a periodical fee. Such expenditures are out of the scope of the research metodology for this survey but we skipped it with the help of a validated member obtaining the following data:

Chilean indicators for "Computer, communications and other services" (% of commercial service Exports, Imports and ratio Exports/Imports)

	Data	2000	2003	2006	2009
1	Exports (%)	25	27	24	N/A
2	Imports (%)	31	26	20	N/A
3	Exports/Imports	0,8	1,04	1,2	N/A

Despite of the basis used to obtain the percentages shown in rows 1 and 2, the ratio of the row 3 could be useful to approach certain balance of payments for this specific area of the ICT economic activity. According to this information the balance changed significantly from 2000 to 2003. On one hand, in 2000 in Chile the money spent by importing technology was over the incomes achieved by the corresponding exportations. On the other hand, by 2003 the country inverted this balance incrementing its exporting capacities over the expenditures in the same class of services and goods. Nevertheless, a prevention could be suggested in order to go insight these figures: in the case of the outcomes registered as Imports every year ¿which portion of the outcomes are simple expenditures (final consumer) and which are investments (resources imported and then used in Chile to produce value added goods and services for domestic consumption or for export)?. Source in References by item. [18]

23.- Total number of ICT companies The information has not been possible to obtain for all years, as in Chile are very few studies of data collection and ICT companies are not newspapers. The 2006 data are based on Chilean publication ICT and Business Services Directory, 2007. This is the first Chilean Directory Business and ICT Services was created to simplify the search for potential partners abroad. The Directory provides information at the national level of services and ICT companies, grouped by industry and the technologies they develop or use. Therefore, the only year for which has been found for the 2006 data. Source in References by item. [16]

24.- Total number of ICT companies per sub-sector

As in the previous item of information has not been possible to get to every year, and the studies available, the sub-classification does not correspond to the requirement.

The information has been obtained from the Chilean document and ICT Services Business Directory, 2007. Therefore, the only year for which has been found for the 2006 data. Source in References by item. [16]

25.- Structure and relations of governmental organizations with competences in ICT policies Data based on document "Basics of Science, Technology and Innovation, 2008, prepared by the National Commission for Scientific and Technological Research (CONICYT) and published in digital bilbioteca it. Source in References by item. [14]

Description of entities included in institutional structure

Instances of Public Policy:

National Innovation Council for Competitiveness: Commission that advises the President of the Republic in the identification, formulation and implementation of policies, plans, measures and other activities related to innovation, including the fields of science the training of specialized human resources and development, transfer and diffusion of technologies.

Committee of Ministers for Innovation: The committee has as its main task is the advisor to the President of the Republic in the implementation of public policy innovation for competitiveness, and serve as a coordinating body between different state agencies related to development Human Capital, Science (R & D) and business innovation in the country and the promotion of a culture that permits and infrastructure consistent with the National Innovation Strategy. In the course of their work, the Commission should pay particular attention to institutional development required, particularly at regional level.

Committee of Ministers for Digital Development: The committee has as its main task, the definition of common lines of action to take on the ministries and public services policies regarding information technology. The tasks of the Committee will be guided to maximize the economic and social impact of public investments in private information technology, around the following priority areas: (i) increases in productivity and competitiveness of the private sector based on adoption and intensive use sophisticated information technology, (ii) the creation and development of a new common sense and national culture in information technology, (iii) promoting quality digital government, integrated, and (iv) increased intensity and sophistication of use of information technology by students and civil society.

Ministry of Education: Secretary of State with a system designed to ensure equitable and quality education that contributes to the integral and permanent training of people and the country's development through the formulation and implementation of policies, standards and sectoral regulation.

Ministry of Economy: State Department whose mission is to promote the modernization and competitiveness of the country's productive structure, private and efficient operation of markets, development of innovation and consolidation of the international integration of the economy country to achieve sustained growth, sustainable and equitable development through the formulation of policies, programs and tools that facilitate the activities of the country's productive units and corporate organizations and institutions related to production and technological development of the country, both public and private, domestic and foreign.

Other Ministries: This group consists of the secretaries of state (Ministers) who are somehow related to the promotion of innovation and production in specific areas, most of whom are part of the National Innovation Council for Competitiveness, the Committee of Ministers for Innovation and the Committee of Ministers for Digital Development. These ministries are: Transport and Telecommunications, Public Works, Agriculture, Foreign Affairs and National Planning.

Promoting Public Agencies and Funders:

National Commission Scientific and Technological Research (CONICYT): The National Commission for Scientific and Technological Research promotes, enhances and disseminates scientific and technological research in Chile, to contribute to economic, social and cultural development. Together, throughout their history, CONICYT has supported the delivery of post-graduate scholarships and funded research and development projects. It has also played an

important role in the systematization of scientific information, the fundamental basis for continuing to generate knowledge. Currently, CONICYT focuses its efforts on promoting the training of advanced human capital and the development and strengthening of scientific and technological basis, taking into account-as keystones-regional development and international links. CONICYT is an autonomous public institution attached to the National Innovation System, which is linked administratively with the Government through the Ministry of Education. Guidelines of Government: The government of President Michelle Bachelet has acquired a strong commitment to economic and social development of the country, which also aims to bridge the gap between India and developed countries. In this task, CONICYT plays a fundamental role, which is reflected both in their participation in the National Innovation Council for Competitiveness (CNIC), as in the definition of its policies and plans of action. CONICYT has 14 lines of credit to public entities. www.conicyt.cl

Chilean Economic Development Agency (CORFO): Chilean Economic Development Agency (CORFO), created in 1939, is the Chilean government agency responsible for promoting national productive activity. CORFO supports Chilean companies that are able to compete in today's markets. Its action ranges from the individual level of individual enterprises and business groups working in partnership to supply chains, including clusters or geographic concentrations of companies and institutions on a productive activity. It also promotes the emergence of new business, renew and diversify the opportunities for growth. That's why CORFO support innovative entrepreneurship and investment, especially those that allow Chile joining international production networks of high competitiveness. Corfo has 23 lines of credit to private entities, central government and other public entities. www.corfo.cl

Experts contacted

Nº	**Institution**	**URL**	**Stakeholders Contacted**
1	National Institute of Industrial Property (INAPI)	www.inapi.cl	Liliana Quezada R. Asistent
2	Center for Digital Economy Santiago Chamber of Commerce (CCS)	www.ccs.cl	Aldo Myrick Executive Secretary
3	Digital Strategy Ministry of Economy	www.estrategiadigital.gob.cl	Patricio Astorga V. Adviser
4	Digital Strategy Ministry of Economy	www.estrategiadigital.gob.cl	Daniel Urbina Adviser
5	Digital Strategy Ministry of Economy	www.estrategiadigital.gob.cl	Pablo Monteverde Adviser
6	Digital Strategy Ministry of Economy	www.estrategiadigital.gob.cl	Kareen Schramm Coordinator ICT Policy and Research
7	European Union Program Department of International Relations CONICYT	www.conicyt.cl	Beatriz Bustos G. Projects Coordinator
8	European Union Program Department of International	www.conicyt.cl	Astrid Walterman Projects Coordinator

	Relations CONICYT		
9	Innovation Division Ministry of Economy	www.economia.cl	Romina Uribe A. Event Coordinator
10	National University Network REUNA	www.reuna.cl	Paola Arellano Executive Director
11	Information Society Programme ECLAC	http://www.eclac.org/socinfo	Massiel Guerra ICT Public Policies Agenda Official
12	Information Society Programme ECLAC	http://www.eclac.org/socinfo/	Ana García Communications Official
13	Innovation Division Ministry of Economy	www.minecon.cl	Juan Ladrón de Guevara Innovation Policy Unit Chief
14	Chilean Companies Trade Association of Software and Services (GECHS)	www.gechs.cl	Luis Stein President

Full list of the main stakeholders of the ICT field

	Entity name	**URL**
ICT associations	1 Asociación de Derecho Informático 2 Asociación Chilena de Empresas de Tecnologías de Información (Acti) 3 Asociación de Proveedores de Internet (API) 4 ONG Derechos Digitales 5 Fundación Chile 6 Gremio de Empresas Chilenas Desarrolladoras de Software (Gechs) 7 Fundación País Digital 8 Sociedad Chilena de Ciencias de la Computación 9 Observatorio TIC - MINECOM 10 Dirección de Energía, Ciencia y Tecnología 11 Red Universitaria Nacional 12 Laboratorio de Transferencia de Tecnologías de la Información (Labti) SUBTEL	www.adi.cl www.acti.cl www.api.cl www.derechosdigitales.org www.fundacionchile.cl www.gechs.cl www.paisdigital.org www.sccc.cl www.observatoriotic.gov.cl www.minrel.gov.cl www.reuna.cl www.labti.cl www.comunidadtecnologica.gob.cl www.sixlabs.cl www.mirs.cl

	13 Comunidad Tecnologica Gubernamental 14 Consorcio Sixlabs 15 Consorcio Tecnológico MIRS	
Companies of the ICT sector		
Companies by ICT sub-sector:		
• *IT Components*	1 Arian S.A. 2 Electromatica Ltda. 3 Enrique Morchio y Compañía Ltda. 4 Genesys Chile Ltda. 5 Getec Ltda. 6 Importadora Downlight 7 Importadora Poirot S.A. 8 Intronica S.A. 9 Kersting S.A. 10 Rittal Ltda. 11 Tecnocal 12 Victronics Ltda.	www.arian.cl www.electromatica.cl www.andeselectronica.cl www.genesyschile.cl www.getec.cl www.downlight.c. www.poirot.cl www.intronica.com www.kersting.cl www.rittal.cl www.tecnocal.cl www.victronics.cl
• *IT Equipment*	1 3 Dimensional 2 Afina Sistemas Informáticos Ltda. 3 Alcatel Lucent 4 AQB S.A. 5 BMV Industrias Eléctricas S.A. 6 Carrasco y Contreras Ltda. 7 Ciclo2 Servicios y Tecnología de la Información 8 Cisco Chile 9 CIT Ltda. 10 Convertec Ltda.	www.3dimensional.cl www.afina-la.com www.alcatel-lucent.com www.aqb.cl www.bmv.cl www.cableadoestructurado.cl www.ciclo2.cl www.cisco.com/cl www.citltda.cl www.convertec.cl www.intellicomp.cl

	11 Costa Brothers y Cia. Ltda. 12 Dell Computer de Chile Ltda. 13 DreamLine S.A. 14 Ebosa S.A. 15 Enet Ltda. 16 Fernández Fica S.A. 17 FSC Chile S.A. / Fujitsu-Siemens Computers 18 H. Briones Sistemas Eléctricos S.A. 19 Hewlett Packard Chile Comercial Ltda. 20 IBM de Chile S.A.C. 21 Industria Electrónica Eko Maiko Ltda. 22 Interlog 23 Kolff S.A. 24 Meldic Ltda. 25 Meltec S.A. 26 NEC Chile S.A. 27 Osram Chile Ltda. 28 Parker Ingeniería S.A. 29 Siemens Enterprise Communications Ltda. 30 Sistemas de Instrumentación Ltda. 31 Sixbell Nekotec Solutions 32 Southern Technology Group S.A. 33 Teknos S.A. 34 Veto y Cia. Ltda. 35 Vigatec S.A.	www.dell.cl www.dreamline.cl www.ebosa.cl www.enetchile.cl www.fernandezfica.cl www.fsc-chile.cl www.hbse.cl www.hp.com www.ibm.com/cl www.ekomaiko.com www.interlog-it.com www.kolff.cl www.meldic.cl www.meltec.cl www.nec.cl www.osram.cl www.parkersa.cl www.siemens.com www.instrumentacion.cl www.sixbellnekotec.com www.stgchile.cl www.teknos.cl www.veto.cl www.vigatec.cl
• *Telecom services*	1 Actividades de Mercado Directo Ltda. 2 AxonAxis S.A. 3 Bell Technologies S.A. 4 BlackBox Chile S.A.	www.callmark.cl www.axonaxis.cl www.e-belltech.com www.blackbox.cl www.cientec.com

	5 Cientec	www.coasin.cl
	6 Coasin Chile S.A.	www.com-unica.cl
	7 Com-unica Ltda.	www.netglobalis.net
	8 Comunicaciones Netglobalis S.A.	www.switch.ch
	9 Comunicaciones Switch Ltda.	www.comunicarchile.cl
	10 Comunicarchile Ltda.	www.conecta.cl
	11 Conecta Ingeniería S.A.	www.consist.cl
	12 Consist Teleinformática S.A.	www.cursor.cl
	13 Cursor Ltda.	www.cybercenter.cl
	14 CyberCenter S.A.	www.datasoft.cl
	15 DataSoft S.A.	www.datco.cl
	16 Datco Chile S.A.	www.dbnet.cl
	17 DBNeT	www.deck.cl
	18 Deck Informática y Diseño Computacional Ltda.	www.dtscallcenter.cl
	19 DTS Ltda. (Desarrollo de Tecnología y Sistemas)	www.e-contact.cl
	20 E-Contact S.A.	www.elpa.cl
	21 Electrónica del Pacífico S.A.	www.rfid.cl
	22 Empresa de Telecomunicaciones RFID Chile Ltda.	www.entelcallcenter.cl
	23 Entel Call Center	www.entel.cl
	24 Entel S.A.	www.ermez.com
	25 Ermez Hard & Soft	www.e-sign.cl
	26 ESign S.A.	www.eticsa.cl
	27 Eticsa	www.faxdatel.cl
	28 Faxdatel Comunicaciones Ltda.	www.gallyas.cl
	29 Gallyas S.A.	www.globalcrossing.com
	30 Global Crossing (SAC Chile S.A.)	www.gtschile.com
	31 Global Technology Software S.A.	www.globalcom.cl
	32 GlobalCom S.A.	www.wcl.cl
	33 Globalcom Telecomunicaciones S.A.	www.grupotrebol.cl
		www.ifxnetworks.com
		www.infocorp.cl

	34 Grupo Trébol S.A.	www.solsis.cl
	35 IFX Networks Chile S.A.	www.puente.gl
	36 Infocorp Chile S.A.	www.inpact.net
	37 Ingeniería Electrónica Solsis Ltda.	www.inred.cl
	38 Ingeniería y Comunicaciones Puente Ltda.	www.intercity.net
	39 Inpact S.A.	www.latintelecomservices.com
	40 Inred Ingeniería Ltda.	www.interluz.cl
	41 Intercity S.A.	www.mediacorp.cl
	42 Latin Telecom Services S.A.	www.netline.cl
	43 Luzlinares S.A.	www.overtech.cl
	44 Media Corp S.A.	www.powernet.cl
	45 Netline Telecomunicaciones S.A.	www.pregost.cl
	46 Overtech Tecnología S.A.	www.raytel.cl
	47 PowerNet	www.reuna.cl
	48 Prego S.A.	www.virtual21.cl
	49 Raytel	www.sinacofi.cl
	50 Red Universitaria Nacional	www.newtec.cl
	51 Representaciones Virtual 21	www.skmportal.com
	52 Sinacofi	www.binaria.cl
	53 Sistemas Digitales Newtec Ltda.	www.hostingpro.cl
	54 SKM Seaprende	www.redsys.cl
	55 Sociedad de Computación Binaria S.A.	www.tarifica.cl
	56 Sociedad de Ingeniería Pulmari Ltda.	www.gps.cl
	57 Sociedad Tecno. de Redes y Sistemas Redsys Ltda.	www.tcs.com
	58 Tarifica Call Control Service	www.techpoint.cl
	59 Tastets System Ltda.	www.tecintegral.cl
	60 Tata Consultancy Services	www.omegatelecom.cl
	61 Techpoint Consultoría y Capacitación	www.tempresas.cl
	62 Tecnología Integral S.A.	www.telmex.com
		www.tgi.cl
		www.transworld.cl

	63 Telecomunicaciones Omegatelecom S.A. 64 Telefónica Empresas CTC Chile S.A. 65 Telmex Servicios Empresariales S.A. 66 TGI 67 Trasworld Import and Export S.A. 68 Viared Computación Ltda. 69 VoissNet S.A. 70 VTR Globalcom S.A. 71 Wireless Energy 72 YX Wireless S.A. 73 Zeus Chile S.A.	www.viared.cl www.redvoiss.net www.vtr.net www.wireless-energy.com www.yxwireless.com www.zeus.cl
• *Computer Services and Software*	1 4Sale 2 Abits Chile S.A. (Representaciones Comerciales S.A.) 3 Accenture Chile Asesorías y Servicios Ltda. 4 Acepta.com S.A. 5 Adexus S.A. 6 Aditiva S.A. 7 Adportas Media Group S.A. 8 Advanced Tech Ltda. 9 Advicom Computación Ltda. 10 Agrosoft Computación S.A. 11 Ahead Ltda. 12 Alex Ramirez Parada 13 Alsacom Ltda. 14 Altanet Ltda. 15 Amadeus Chile S.A. 16 América XXI Ltda. 17 Andalaft Consultores Ltda. 18 Angecom Computación Ltda.	www.4sale.cl www.abits.cl www.accenture.com www.acepta.com www.adexus.com www.aditiva.com www.adportas.com www.atech.cl www.advicom.cl www.agrosoft.cl www.ahead.cl www.puntosdeventa.cl www.alsacom.cl www.altanet.cl www.amadeus.cl www.americaxxi.cl www.webempresario.cl www.angecom.cl www.anida.cl

	19	Anida Consultores S.A.	www.ays.cl
	20	Answers & Solutions	www.acl.cl
	21	Aplicaciones Computacionales Ltda.	www.argentis.cl
	22	Argentis S.A.	www.aroasystem.cl
	23	Aroasystem Ltda.	www.artech.cl
	24	Artech Soluciones Informáticas	www.info2000.cl
	25	Asesorías Info2000 Ltda.	www.aseycomp.cl
	26	Aseycomp Ltda.	www.asicom.cl
	27	Asicom S.A.	www.asistek.cl
	28	Asistek Instrumentación y Control	www.asyntec.cl
	29	Asyntec	www.atcom.cl
	30	Atcom Outsourcing S.A.	www.atentochile.cl
	31	Atento Chile S.A.	www.axoft.com
	32	Axoft Chile S.A.	www.axonsoftware.cl
	33	Axon Software & Technology S.A.	www.axys.cl
	34	Axys S.A.	www.ayerviernes.com
	35	AyerViernes S.A.	www.azurian.com
	36	Azurian Chile S.A.	www.servipyme.cl
	37	Bandesarrollo ServiPyme S.A.	www.bettersoft.cl
	38	Better Software & Consulting S.A.	www.beyond.cl
	39	Beyond Technologies Chile S.A.	www.bluecompany.cl
	40	Blue Company S.A.	www.bormax.cl
	41	Bormax S.A.	www.browse.cl
	42	Browse Ingeniería de Sistemas	www.bes.cl
	43	Business Ingeniering Solution SVP Ltda.	www.trackit.cl
	44	Capacitación Trackit Ltda.	www.caps.cl
	45	Caps Integración	www.caschile.cl
	46	CAS Chile S.A.	www.cenitvitriol.cl
	47	Cenit Vitriol TI	www.teleduc.cl
			www.cepi.cl
			www.cie.cl

	48	Centro de Educación a Distancia (Teleduc)	www.certifica.com
	49	Centro de Estudios y Perfeccionamiento Industrial Ltda.	www.cgn.cl
	50	Centro De Informática Educativa CIE	www.chesswinner.cl
	51	Certifica.com	www.chile.com
	52	CGN Business Performance Consulting	www.cibergroup.cl
	53	Chesswinner S.A.	www.circulo.cl
	54	Chile.com	www.colegiointeractivo.com
	55	Cibergroup S.A.	www.genhome.cl
	56	Circulo.cl	www.integrasystem.cl
	57	Colegio Interactivo	www.comgrap.cl
	58	Comercial e Inmobiliaria Genhome Ltda.	www.compudata.cl
	59	Comercial Integrasystem Ltda	www.compunet.cl
	60	Comgrap	www.alburquenque.cl
	61	CompuData Ltda.	www.coinsa.cl
	62	Compunet Ltda.	www.olidata.cl
	63	Computación e Informática Cinta S.A.	www.computerdesign.cl
	64	Computación e Ingeniería S.A.	www.consultec.cl
	65	Computación Olidata Ltda.	www.cnum.cl
	66	Computer Design Chile	www.cdi.cl
	67	Consultec Ltda.	www.koncept.cl
	68	Consultora y Desarrollo Informático CNUM Ltda.	www.controlandlogic.cl
	69	Consultores de Ingeniería Ltda.	www.copelec.cl
	70	Consultoría en Tecnología Koncept Ltda.	www.datamarketing.cl
	71	Control & Logic Ingeniería Ltda.	www.datacomex.cl
	72	Cooperativa de Consumo de Energía Eléctrica Chillán Ltda.	www.datanetsa.com
	73	Data Marketing Security Ltda.	www.datum.cl
	74	Datacomex S.A.	www.defontana.com
	75	Datanet S.A.	www.desamd.cl
	76	Datum S.A. (Central de Procesamiento de Datos S.A.)	www.dts.cl
			www.demacofi.cl
			www.disoft.cl

	77	Defontana Servicios S.A.	www.docirs.cl
	78	Desamd	www.drysoft.com
	79	Desarrollo de Tecnologías y Sistemas Ltda.	www.eyd.cl
	80	Dimacofi S.A.	www.enable.cl
	81	Disoft Computación Ltda.	www.edapi.cl
	82	DocIRS, Análisis y Diseño de Sist. de Info. Computacional Ltda.	www.educationholdings.com www.eftgroup.net
	83	Drysoft Ltda.	www.egs.cl
	84	E&D Ingeniería y Servicios Ltda.	www.elogos.cl
	85	E.nable	www.emc.com
	86	Edapi S.A.	www.quanam.com
	87	Educación Digital S.A.	www.epson.cl
	88	EFT Group S.A.	www.esri-chile.com
	89	EGS Computación	www.everis.cl
	90	Élogos S.A.	www.excelsys.cl
	91	EMC Chile S.A.	www.eximed.cl
	92	Enorey International Ltda. (Quanam)	www.expotrade.cl
	93	Epson Chile S.A.	www.fabelec.cl
	94	Esri Chile S.A.	www.agtec.cl www.firsa.cl
	95	Everis Chile S.A.	www.flexwin.cl
	96	Excelsys S.A.	www.fullcomputer.cl
	97	Eximed S.A.	www.g3.cl
	98	Expotrade Chile S.A.	www.genbiz.cl
	99	Fabelec Ltda.	www.genera.cl
	100	Ferrera y Herquiñigo Asociados Ltda.	www.gentta.cl
	101	Fir Ingeniería de Software S.A.	www.geosystem.cl
	102	Flexwin Computación Ltda.	www.globalservices.cl
	103	Full Computer Comercial Ltda.	www.grupofact.com
	104	G3 S.A.	www.gsmchile.com
	105	Genbiz	www.gsur.cl

	106	Genera S.A.	www.helpnet.cl
	107	Gentta Servicios y Gestión	www.idepcapacitacion.cl
	108	Geosystem Ltda.	www.imagemaker.cl
	109	Global Services S.A.	www.imatronix.cl
	110	GrupoFACT	www.inmotion.cl
	111	GSM Chile	www.indra.es
	112	GSur S.A.	www.infoland.cl
	113	Helpnet Ingeniería y Servicios de RR.HH. Ltda.	www.itg-salud.cl
	114	Idep Ltda.	www.informat.cl
	115	Imagemaker IT S.A.	www.i-technology.cl
	116	Imatronix S.A.	www.kioskos.cl
	117	In Motion S.A.	www.ingsoft.cl
	118	Indra Sistemas Chile S.A.	www.solem.cl
	119	Infoland S.A.	www.triosoft.cl
	120	Información, Tecnologías y Gestión para Salud	www.proexsi.cl
	121	Informat S.A.	www.alnitak.cl
	122	Information Technology Ltda.	www.ingesic.cl
	123	Ingelan Servicios	www.ingesoft.net
	124	Ingeniería de Software Ltda.	www.ingrammicro.cl
	125	Ingeniería Solem Ltda.	www.insis.cl
	126	Ingeniería Triosoft Ltda.	www.interchile.com
	127	Ingeniería y Procesos Electr. Contables Ltda. (Proexsi Ltda)	www.inter-media.cl
	128	Ingeniería y Servicios Alnitak S.A.	www.securities.com
	129	Ingesic Ltda.	www.interplanet.cl
	130	Ingesoft Ltda.	www.intersystems.com
	131	Ingram Micro Chile S.A.	www.inverca.cl
	132	Insis S.A.	www.dangueris.cl
	133	Interchile Ltda.	www.sutter-line.cl
	134	Intermedia S.A.	www.isc.cl
			www.istec.cl
			www.qad.cl

	135	Internet Securities de Chile Ltda.	www.juzt-reboot.cl
	136	Interplanet S.A.	www.kepler.cl
	137	Intersystems Chile Ltda.	www.kibernum.cl
	138	Inverca S.A.	www.kinetica.cl
	139	Inversiones Dangueris Ltda.	www.kores.cl
	140	Inversiones Sutter-Line S.A.	www.krconsulting.cl
	141	ISC S.A.	www.latinhire.com
	142	Istec Innova Service Tecnología Ltda.	www.lyp.cl
	143	IT Consulting S.A. (QAD Chile)	www.magenta.cl
	144	Juzt-Reboot Chile y Latinoamèrica	www.manager.cl
	145	Kepler Data Recovery	www.dmapas.com
	146	Kibernum S.A.	www.treffic.cl
	147	Kinetica Ltda.	www.mcafee.com
	148	Kores Chilena S.A.I.y C.	www.mekanoasicom.cl
	149	KR Consulting Ltda.	www.melcomp.cl
	150	Latinhire	www.metanoia.cl
	151	Lechner y Cia Ltda.	www.microgeo.cl
	152	Magenta Computación S.A.	www.micrologica.com
	153	Manager Software S.A.	www.microserv.cl
	154	Mapas Digitales S.A.	www.microsoft.com
	155	Marketing Relacional & Support S.A.	www.mosaq.com
	156	McAfee Chile S.A.	www.nacom.cl
	157	MekanoAsicom S.A.	www.ncr.com
	158	Melcomp Computación	www.nectia.com
	159	Metanoia Chile S.A.	www.nemesis.cl
	160	Microgeo S.A.	www.packardbell.cl
	161	Micrológica S.A.	www.netred.cl
	162	Microserv Ltda.	www.neuronet.cl
	163	Microsoft Chile	www.nts.cl
			www.ngs.cl
			www.nielsoft.com

	164	Mosaq Consultores Ltda.	www.nivel5.cl
	165	Nacom S.A.	www.novared.cl
	166	NCR Chile Industrial Comercial Ltda.	www.ne.cl
	167	Nectia S.A.	www.olesen.cl
	168	Némesis Informática S.A.	www.ondac.com
	169	Net Now S.A.	www.onvision.cl
	170	Netred S.A.	www.vernet.cl
	171	Neuronet	www.opendat.cl
	172	New Technological Services	www.optimisa.cl
	173	NGS Tecnologías de Información	www.oracle.com/cl
	174	Nielsoft Informática Ltda.	www.orange-business.com
	175	Nivel 5 S.A.	www.orion-ds.com
	176	Novared S.A.	www.orizola.cl
	177	Núcleo Educativo S.A.	www.pad.cl
	178	Olesen Computer y Cia. Ltda.	www.pandasoftware.cl
	179	Ondac Chile S.A.	www.paperless.cl
	180	Onvision S.A.	www.paradigma.cl
	181	Opazo y Martins Ltda.	www.partner.cl
	182	Opendat S.A.	www.pineal.cl
	183	Optimisa S.A.	www.plus.cl
	184	Oracle Chile	www.plusonline.cl
	185	Orange Business Services	www.policomp.com
	186	Orión Desarrollo y Sistemas	www.pragma.cl
	187	Orizola Ingeniería de Software	www.pretorian.cl
	188	PAD Systems Consulting S.A.	www.prorm.com
	189	Panda Software Chile Ltda.	www.prosystem.cl
	190	Paperless Chile (E-Partners S.A.)	www.provectis.cl
	191	Paradigma Ltda.	www.cg3.cl
	192	Partner Consulting Ltda.	www.pymetec.cl
			www.qusoft.cl
			www.quam.cl

	193	Pineal Consultores	www.quintec.cl
	194	Plus Consult Ltda.	www.ryc.cl
	195	Plus Online Services S.A.	www.recycla.cl
	196	Policomp S.A.	www.rhiscom.com
	197	Pragma Informática S.A.	www.syachile.cl
	198	Pretorian Ltda.	www.atentus.com
	199	ProRM Chile S.A.	www.arrienda.cl
	200	Prosystem Ingeniería de Sistemas Ltda.	www.conectu.com
	201	ProVectis S.A.	www.supportchile.cl
	202	Publicidad y Marketing CG3 Ltda.	www.sicot.cl
	203	PymeTec	www.sigma.cl
	204	Quality Software	www.sintesis.cl
	205	Quam S.A.	www.sisbo.cl
	206	Quintec Aplicaciones de Negocios S.A.	www.ingenix.cl
	207	R&C Servicios Computacionales Ltda.	www.sistemasltda.c.
	208	Recycla Chile S.A.	www.sisrel.cl
	209	Rhiscom	www.smartvision.cl
	210	S&A Consultores Asociados Chile Ltda.	www.saydex.cl
	211	Servicios de Monitoreo S.A.	www.maia.cl
	212	Servicios e Inversiones Arrienda Ltda.	www.ungasoft.cl
	213	Servicios Informaticos Conectu.com Ltda.	www.softweb.cl
	214	Servicios Profesionales Support Ltda.	www.softart.cl
	215	Sicot Ltda.	www.softland.cl
	216	Sigma S.A.	www.softron.biz
	217	Sintesis S.A.	www.softwareag.cl
	218	Sisbo Sistemas Backoffice Ltda.	www.softwarechile.cl
	219	Sistema de Informacion Ingenix Ltda.	www.solutionplus.cl
	220	Sistemas Ltda.	www.soleduc.cl
	221	Sistemas Relacionales S.A.	www.solex.cl
			www.ingnova.cl
			www.solint.cl

	222	Smartvision TI	www.sonda.com
	223	Sociedad de Ingenería en Informática Saydex Ltda.	www.sparq.cl
	224	Sociedad de Inversiones Maia Ltda.	www.sqltech.cl
	225	Sociedad de Inversiones Unga S.A.	www.st.cl
	226	Soft Web Chile Ltda.	www.stanmetalcomputacion.cl
	227	Softart Ltda.	www.sun.cl
	228	Softland Ltda.	www.syscomsoftware.cl
	229	Softron S.A.	www.techdata.cl
	230	Software AG España S.A. (Agencia en Chile)	www.tecfo.cl
	231	Software Chile S.A.	www.exceed.cl
	232	Software Ingeniería	www.tecnova.cl
	233	Soleduc Ltda.	www.testgroup.cl
	234	Solex	www.flexline.cl
	235	Soluciones Empresariales Ltda.	www.stockergroup.com
	236	Soluciones Integrales S. A.	www.tide.cl
	237	Sonda S.A.	www.transtecnia.cl
	238	Sparq Technology S.A.	www.trebol-it.com
	239	SQL Technology S.A.	www.tuxpan.com
	240	ST Computación S.A.	www.uvirtual.cl
	241	Stanmetal Chile Ltda.	www.ultragestion.cl
	242	Sun Microsystems de Chile S.A.	www.unione.cl
	243	SysCom Software	www.visoft.cl
	244	Tech Data Chile S.A.	www.visualchile.cl
	245	Tecnología del Futuro S.A.	www.virtualmarket.cl
	246	Tecnologías de la Información Exceed	www.vptsa.cl
	247	Tecnova Ltda.	www.wisetrack.cl
	248	Testgroup Servicios de Testing Ltda.	www.xerox.cl
	249	The Flexline Company	www.xperience.cl
	250	The Stocker Group S.A.	www.colegiointeractivo.com

	251 Tide S.A. 252 Transtecnia S.A. 253 Trébol-IT, Omega Ingeniería de Software S.A. 254 Tuxpan Software S.A. 255 U Virtual S.A. 256 Ultragestión S.A. 257 UniOne Consulting Chile S.A. 258 Visoft 259 Visual Chile Ltda. 260 VMK S.A. 261 VPT S.A. 262 Wisetrack Chile S.A. 263 Xerox de Chile S.A. 264 Xperience Consulting Services 265 Zamora Consultores Ltda.	
Funding agencies	1 Innova Chile Corporación de Fomento a la Producción (Corfo) 2 Comisión Nacional de Ciencia y Tecnología (Conicyt) 3 Agricultural Research Fund (FIA) 4 Mecesup Mineduc 5 Iniciativa Científica Milenio Mideplan	www.corfo.cl www.conicyt.cl www.fia.cl www.mecesup.cl www.iniciativamilenio.cl
Higher education institutions	1 Pontificia Universidad Católica de Chile 2 Pontificia Universidad Católica de Valparaíso 3 Universidad Arturo Prat 4 Universidad Austral de Chile 5 Universidad Católica de La Santísima Concepción 6 Universidad Católica del Maule 7 Universidad Católica del Norte 8 Universidad Católica de Temuco 9 Universidad de Antofagasta	www.puc.cl www.puc.cl www.ucv.cl www.ucv.cl www.unap.cl www.unap.cl www.uach.cl www.uach.cl www.ucsc.cl www.ucsc.cl www.ucm.cl www.ucm.cl www.ucn.cl www.ucn.cl www.uctemuco.cl www.uctemuco.cl www.uantof.cl www.uantof.cl

	10 Universidad de Atacama	www.uda.cl www.uda.cl
	11 Universidad de Chile	www.uchile.cl www.uchile.cl
	12 Universidad de Concepción	www.udec.cl www.udec.cl
	13 Universidad de La Frontera	www.ufro.cl www.ufro.cl
	14 Universidad de La Serena	www.userena.cl www.userena.cl
	15 Universidad del Bío-Bío	www.ubiobio.cl www.ubiobio.cl
	16 Universidad de Los Lagos	www.ulagos.cl www.ulagos.cl
	17 Universidad de Magallanes	www.umag.cl www.umag.cl
	18 Universidad de Playa Ancha de Ciencias de la Educación	www.upla.cl www.upla.cl
	19 Universidad de Santiago de Chile	www.usach.cl www.usach.cl
	20 Universidad de Talca	www.utalca.cl www.utalca.cl
	21 Universidad de Tarapacá	www.uta.cl www.uta.cl
	22 Universidad de Valparaíso	www.uv.c www.uv.c
	23 Universidad Metropolitana de Ciencias de la Educación	www.umce.cl www.umce.cl
	24 Universidad Técnica Federico Santa María	www.utfsm.cl www.utfsm.cl
	25 Universidad Tecnológica Metropolitana UTEM	www.utem.cl
Research organizations (public and private)	1 Centro Científico y Tecnológico de Valparaíso	www.cctval.usm.cl
	2 Centro de óptica y Fotónica	www.cefop.cl
		www.cmm.uchile.cl
	3 Centro de Modelamiento Matemático	www.fundacionchile.cl
	4 Fundación Chile	www.paisdigital.org
	5 Fundación País Digital	www.microdatos.cl
	6 Núcleo Científico Milenio Centro de Microdatos	www.quantum-optics.udec.cl
	7 Núcleo Científico Milenio Centro de Óptica e Información Cuántica	www.dcc.uchile.cl
	8 Departamento de Ciencias de la Computación, Universidad de Chile	www.proteinlab.cl
	9 Programa de Prospectiva e Innovación Tecnológica, ProteinLab UTEM	www.cie.cl
	10 Centro de Informática Educativa, CIE PUC	
Entities participating in R&D projects		

• Entities participating in international R&D projects	1	UNIVERSIDAD DE TALCA	www.utalca.cl
	2	UNIVERSIDAD DE LA FRONTERA	www.ufro.cl
	3	UNIVERSIDAD DE VALPARAISO	www.uv.c
	4	FUNDACION CIENCIA PARA LA VIDA	www.cienciavida.cl
	5	CENTRO DE ESTUDIOS AVANZADOS EN ZONAS ARIDAS	www.ceaza.cl
	6	UNIVERSIDAD TECNICA FEDERICO SANTA MARIA	www.utfsm.cl
	7	UNIVERSIDAD DE CONCEPCION	www.udec.cl
	8	PONTIFICIA UNIVERSIDAD CATOLICA DE CHILE	www.puc.cl
	9	ASOCIACION DE DERECHOS E INFORMATICA DECHILE	www.adi.cl
	10	ASOCIACION REGIONAL DE TELEVISION DEL BIO BIO ASOCIACION GREMIAL	www.aretelbiobio.cl
	11	HYC AMERICAS SA	www.hyctv.com
	12	CEPAL	www.eclac.org
	13	REUNA en Cooperación Latinoamericana de Redes Avanzadas (RED CLARA)	www.reuna.cl
	14	CONICYT	www.conicyt.cl
	15	UNIVERSIDAD DE CHILE (UCH)	www.uchile.cl
	16	UNIVERSIDAD DE MAGALLANES (UMAG)	www.umag.cl
	17	FUERZA AÉREA DE CHILE (SAF)	www.saf.cl
	18	CT VALPARAISO S.A. - PONTIFICIA UCV	www.ctvalpo.cl
	19	ONG Derechos Digitales	www.derechosdigitales.org
	20	Universidad Austral de Chile	www.uach.cl
	21	Universidad Tecnológica Metropolitana (UTEM)	www.utem.cl

• Entities participating in national/regional R&D projects, that don't participate in international projects	1	UNIVERSIDAD DIEGO PORTALES	www.udp.cl
	2	UNIVERSIDAD DE SANTIAGO DE CHILE	www.usach.cl
	3	UNIVERSIDAD ADOLFO IBÁÑEZ	www.uai.cl
	4	UNIVERSIDAD DE LOS ANDES	www.uandes.cl
	5	UNIVERSIDAD CATÓLICA DE LA SANTÍSIMA CONCEPCIÓN	www.ucsc.cl
	6	UNIVERSIDAD DEL BÍO BÍO	www.ubb.cl
	7	UNIVERSIDAD CATÓLICA DE TEMUCO	www.uctemuco.cl
	8	UNIVERSIDAD SANTO TOMÁS	www.ust.cl
	9	UNIVERSIDAD DE LOS LAGOS	www.ulagos.cl
Other reference institutions from the research community	1	Air Photographic Service	www.saf.cl
	2	Chilean Antarctic Institute (INACH)	www.inach.cl
	3	Chilean Nuclear Energy Commission (CCHEN)	www.cchen.cl
	4	Hydrographic and Oceanographic Service (SHOA)	www.shoa.cl
	5	Military Geographical Institute (IGM)	www.igm.cl
	6	National Service for Geology and Mining	www.sernageomin.cl
	7	National Standardization Institute (INN)	www.inn.cl
	8	Instituto Milenio Sistemas Complejos de Ingeniería	www.sistemasdeingenieria.cl
	9	Centro para el Desarrollo de la Nanociencia y Nanotecnología	www.cedenna.cl
	10	Fundación para la Innovación Agraria - FIA	www.fia.gob.cl
	11	Centro de Estudios de Tecnologías de Información, CETIUC	www.cetiuc.cl

Details and information for SWOT analisys

2.2 *Failures in the systematization of information on ICT:*

For instance, there is not a single official directory with ICT industries and companies to facilitate the discovery of potential suppliers or partners for R+D+I ventures, to evaluate market share, coordinate the sector for some political dialogue, participate in the definition of regulations, standards of quality, etc. [39]

2.5 *Low participation of ICT area in national funding programs:*

On one hand, this could be due to a low priority that the granting institutions and evaluating committees give to projects in which ICTs are the main focus of research and not merely an intermediate instrument to reach other results. On the other hand, it may be due to the lack of critical mass of researchers in the ICT area (applied research) in Chile, which number is not enough to counterbalance the massive capacity and large number of researchers from mainly scientific areas (basic research) submitting projects for the clusters and areas that finally acquire the highest percentage of funds. For example, CONICYT as the main national agency for promotion of R&D manages the Fund for the Promotion of Scientific and Technological Development FONDEF. This fund in 2009 executed a budget of 12066 million pesos (around 15,5 millions of Euro). In the "2006-2009 Management Report" of CONICYT, it is reported the FONDEF budget distribution by area of R&D projects along with a comparison for the years 2005 and 2009. According to that report, in 2005, ICT ranked in the 4th place of priority with 12% below "Fisheries and Aquaculture" (32%), "Health" (15%) and manufacturing (14%). Surprisingly, then in 2009, ICTs still remain in 4th place, but this time with a 10% of FONDEF budget (less than 12% in 2005!), and sharing the same percentage as "Health" and "Education", behind the three top priorities: "Fisheries and Aquaculture (26%), "Energy and Water" (17%) and "Agricultural" (16%).

2.6 Low participation of the ICT area in financing programs for Advanced Human Capital Formation:

The "2006-2009 Management Report" of CONICYT, shows the percentages of scholarships and financial support for advanced studies given by areas of development in 2009. The figures themselves show the comparative low priority of ICT wich can be mainly contained in the "Engineering and Technology" area described in the report.

a) Percentage of scholarships and financial support for prosecution of postgraduate studies in Chilean Institutions:

a1) Doctorate studies

51% Natural Sciences

15% Humanities

13% Engineering and Technology

a2) Master studies

46% Social Sciences

21% Humanities

20% Natural Sciences

6% Engineering and Technology

b) Percentage of scholarships and financial support for prosecution of postgraduate studies in foreign institutions:

b1) Doctorate studies:

43% Social Sciences

27% Natural Sciences

12% Engineering and Technology

b2) Master studies:

48% Social Sciences

20% Humanities

12% Natural Sciences

12% Engineering and Technology

4.3 *Generational gaps and differences in both the state and private sector in the manage the use of ICTs:*

In the world, and in Chile, the average age of people who start in activities of research and entrepreneurship in professional and business areas are increasingly lower, producing to a generational difference in the State sector because there a very slow renewal of political authorities, respect to generations working at the operational sphere. In contrast, at the private sector this generational difference between those who design and manage policies and development strategies and those that run them, is not as strong since there is a need to dynamically update the policies and business strategies for production and market behavior, where times and requirements must be observed and made quickly, efficiently and with a global view.

Conclusions. Further analisys and comments

Strategic priorities of Chile

From the analisys of the national situation in Chile with respect to ICTs, some strategic priorities can be suggested for Chile as guidelines for the public policy implementation:

-Education: To increase ICT education from early childhood to get technologically enabled citizens who are aware of the potential of ICTs as tools for life. Thence, it is necessary to guide and strengthen the different levels of people's education even influencing the technological profile of educational models and curricula in higher education for undergraduate and postgraduate students.

-Decentralized infrastructure: to develop the largest possible network infrastructure for communications services (Internet, telephony, broadcasting) capable of providing national coverage with greater equity and uniformity in the standard of its capabilities so as to support the ever greater technical demands that the new services operated over the networks and platforms impose on the available bandwidth.

-ICT Access: Apart from improving the coverage through the development of infrastructure (for which the State already operates as a subsidiary agent) it is necessary to ensure broad conditions for the access of people to the benefits emerging from this infrastructure and associated technologies. This must be understood both as a guaranty to access networks, communication systems and information capital and as a guaranty for accessing the equipment that makes possible its use. In this sense it is interesting to determine which objects or level of technological resources can begin to be considered as life necessities and which constitute consumer goods or

even luxury to discriminate the boundaries of the guarantees of access and support that the State could assume.

- Improvement of institutional and regulatory framework: Chile must strengthen the role of government institutions that operate as regulators and promoters of the ICT industry development by adapting the scope of the various state and private actors in tune with the changing ICT industry especially with regard to telecommunications. For example, in that field, Chile could consider to effectively separate the control and law enforcing role from that of promoting the production when facing the ICT industry. Currently, both functions are to some extent assigned to the same state agency (SUBTEL).

- Innovation: Promoting innovation, and the entire chain of research and development that precedes it, helps to improve the country's balance between producing and consuming new technologies.

Future trends and areas of common interests

Some trends and challenges that the targeted countries can consider as common motivations and could be achieved through cooperation projects like FORESTA:

- To achieve higher commercial, academic and cultural interaction between countries of the LatAm region and with European partners.

- To let the partners reach a more concrete an updated mutual knowledge about their capacities and ICT development status. This means for a country like Chile to deepen its knowledge about the ongoing initiatives and state of the technique in all the countries of its near environment as well as in EU.

- Clearly visualize the map of skills and technological development of other countries can help removing mutual prejudices. To have better awareness of the own development reality at the regional and global context is a basic condition to discover and exploit the potential of collaboration to carry out joint research actions, and to develop new products and services, innovations and businesses. In a globalized international system the ignorance about the capabilities and development level of other countries creates distortions in the priorities and development strategies that each country handles locally.

ANNEX IV – Issues related to the ICT policies analysis in Argentina

Explanation regarding key indicators

1. *Country Population:* The information has been obtained from official website of the National Institute of Statistics and Censuses (INDEC).
2. *GDP per capita:* The information has been obtained from official website of the National Institute of Statistics and Censuses (INDEC).
3. *Weight of ICT in GDP*: The information has been obtained from the websites of Argentine Republic Chamber of Informatics and Communications (CICOMRA) and Prince, Cooke & Associates (private company devoted to information, research and analysis of the IT and telecommunications markets).
4. *Weight in GDP by sub-sectors*: The information has been obtained from the websites of Argentine Republic Chamber of Informatics and Communications (CICOMRA) and Prince, Cooke & Associates (private company devoted to information, research and analysis of the IT and telecommunications markets).
5. *% national budget dedicated to ICT*: The information has not been possible to include in this report because there is no such indication in the official documents published by government and private institutions accredited to deliver this information.
6. *Mobile subscribers in total / per 100 inhabitants:* The information has been obtained from the official websites of the National Institute of Statistics and Censuses (INDEC), the Argentine Republic Chamber of Informatics and Communications (CICOMRA) and Prince, Cooke & Associates (private company devoted to information, research and analysis of the IT and telecommunications markets).
7. *Internet subscribers in total / per 100 inhabitants* The information has been obtained from the official websites of the National Institute of Statistics and Censuses (INDEC), the Argentine Republic Chamber of Informatics and Communications (CICOMRA) and Prince, Cooke & Associates (private company devoted to information, research and analysis of the IT and telecommunications markets).
8. *Broadband subscribers in total / per 100 inhabitants* The information has been obtained from the official websites of the National Institute of Statistics and Censuses (INDEC), the Argentine Republic Chamber of Informatics and Communications (CICOMRA) and Prince, Cooke & Associates (private company devoted to information, research and analysis of the IT and telecommunications markets).
9. *Internet penetration in total / per 100 inhabitants* The information has been obtained from the official websites of the National Institute of Statistics and Censuses (INDEC), the Argentine Republic Chamber of Informatics and Communications (CICOMRA) and

Prince, Cooke & Associates (private company devoted to information, research and analysis of the IT and telecommunications markets).

10. *% of businesses with 10 or more employees using the Internet*: The information has not been possible to include in this report because there is no such indication in the official documents published by government and private institutions accredited to deliver this information.
11. *Share of ICT-related occupations in the total economy in selected countries*: The information has not been possible to include in this report because there is no such indication in the official documents published by government and private institutions accredited to deliver this information.
12. *Telecommunication services revenue in total*: The information has not been possible to include in this report because there is no such indication in the official documents published by government and private institutions accredited to deliver this information.
13. *Mobile telecommunication services revenue in total*: The information has not been possible to include in this report because there is no such indication in the official documents published by government and private institutions accredited to deliver this information.
14. *Telecommunication infrastructure investment in total*: The information has not been possible to include in this report because there is no such indication in the official documents published by government and private institutions accredited to deliver this information.
15. *Total R&D expenditure*: The information has not been possible to include in this report because there is no such indication in the official documents published by government and private institutions accredited to deliver this information.
16. *ICT-related patents as a percentage of national total*: The information has not been possible to include in this report because there is no such indication in the official documents published by government and private institutions accredited to deliver this information.
17. *Total number of ICT companies*: The information has not been possible to include in this report because there is no such indication in the official documents published by government and private institutions accredited to deliver this information.

Full list of the main stakeholders of the ICT field

	Entity name	**URL**
ICT associations	Software & IT Services Chamber of Commerce (CESSI)	www.cessi.org.ar
	Informatics & Communications Chamber of Commerce (CICOMRA)	www.cicomra.org.ar

	Argentina Internet Services Industry Association (CABASE)	www.cabase.org.ar
	Civil Association for the Study and Promotion of the Information Society	www.links.org.ar
	Argentine Network of Digital Organizations – RODAr	www.rodargentina.net
Companies of the ICT sector		
• Telecom Services	*Telmex*	*www.telmex.com/ar*
	Global Crossing	*www.globalcrossing.com/LATAM/sp/company/company_global_caring_argentina.aspx*
	IPlan	*iplan.com.ar*
	Claro	*www.claro.com.ar*
	Movistar	*www.movistar.net.ar*
	Nextel	*www.nextel.com.ar/*
	Personal	*www.personal.com.ar*
	Telecom	*www.telecom.com.ar*
	Telefónica	*www.telefonica.com.ar*
	Cablevision	*www.cablevision.com.ar*
	Velocom	*www.velocom.com.ar*
	Telecentro	*www.telecentro.com.ar*
• *Computer services and software*	*Axoft Argentina S.A.*	*www.axoft.com*
	ABC Consulting S.A.	*www.abcconsulting.com.ar*
	Ardison Software & Consulting	*www.ardison.com*

	Buenos Aires Software S.A.	*www.bas.com.ar*
	Buffa Sistemas SRL	*www.bs.com.ar*
	C&S Informatica S.A.	*www.cys.com.ar*
	Cubika	*www.cubika.com*
	Datastar Argentina S.A.	*www.datastar.com.ar*
	GRUPO PROMINENTE	*www.grupoprominente.com*
	Globaltech S.A.	*www.globaltechsa.com.ar*
	Grupo ASSA	*www.grupoassa.com*
	Grupo Leviminond	*www.leviminond.com*
	HEXACTA S.A.	*www.hexacta.com*
	ICEBERG SOLUTIONS	*www.icebergsolutions.com*
	Ingemática	*www.ingematica.com.ar*
	InterSoft S.A.	*www.intersoft.com.ar*
	Lupa Corporation S.A.	*www.lupacorp.com*
	NEORIS	*www.neoris.com*
	Open Solutions Argentina S.A.	*www.open-sol.com.ar*
	Sistemas Bejerman S.A.	*www.bejerman.com*
	Tecnosoftware S.A.	*www.tecnosoftware.com.ar*
• IT equipments	*Hewlett Packard*	*www.hp.com.ar*
	IBM	*www.ibm.com.ar*
	Epson	*www.epson.com.ar*
	Xerox	*www.xerox.com.ar*
	Panasonic	*www.panasonic.com.ar*

	Siemens	*www.siemens.com.ar*
	Coradir	*www.coradir.com.ar*
	BGH	*www.bgh.com.ar*
	DAXA	*www.daxa.com.ar*
	Bangho	*www.bangho.com.ar*
• IT components	*COASIN Comunicaciones*	*www.coasincom.com.ar*
	Electrocomponentes	*www.electrocomponentes.com*
	Elko Componentes	*www.elkonet.com*
	Energit	*www.energitsa.com.ar*
	Novatech	*www.novatech-online.com*
Funding agencies	Ministry of Science, Technology and Productive Innovation	www.mincyt.gov.ar
Higher education institutions	Universidad de Buenos Aires	www.uba.ar
	Universidad Nacional de Catamarca	www.unca.edu.ar
	Universidad Nacional de Chilecito	www.undec.edu.ar
	Universidad Nacional de Córdoba	www.unc.edu.ar
	Universidad Nacional de Cuyo	www.uncu.edu.ar
	Universidad Nacional de Entre Ríos	www.uner.edu.ar
	Universidad Nacional de Formosa	www.unf.edu.ar
	Universidad Nacional de General San Martín	www.unsam.edu.ar

Universidad Nacional de Jujuy	www.unju.edu.ar
Universidad Nacional de la Matanza	www.unlm.edu.ar
Universidad Nacional de la Pampa	www.unlpam.edu.ar
Universidad Nacional de la Patagonia Austral	www.unpa.edu.ar
Universidad Nacional de la Patagonia San Juan Bosco	www.unp.edu.ar
Universidad Nacional de la Plata	www.unlp.edu.ar
Universidad Nacional de la Rioja	www.unlar.edu.ar
Universidad Nacional de Lanús	www.unla.edu.ar
Universidad Nacional de Lomas de Zamora	www.unlz.edu.ar
Universidad Nacional de Luján	www.unlu.edu.ar
Universidad Nacional de Misiones	www.unam.edu.ar
Universidad Nacional de Quilmes	www.unq.edu.ar
Universidad Nacional de Río Cuarto	www.unrc.edu.ar
Universidad Nacional de Rosario	www.unr.edu.ar
Universidad Nacional de Salta	www.unsa.edu.ar

	Universidad Nacional de San Juan	www.unsj.edu.ar
	Universidad Nacional de San Luis	www.unsl.edu.ar
	Universidad Nacional de Santiago del Estero	www.unse.edu.ar
	Universidad Nacional de Tres de Febrero	www.untref.edu.ar
	Universidad Nacional de Tucumán	www.unt.edu.ar
	Universidad Nacional de Villa María	www.unvm.edu.ar
	Universidad Nacional del Centro de la Provincia de Buenos Aires	www.unicen.edu.ar
	Universidad Nacional del Comahue	www.uncoma.edu.ar
	Universidad Nacional del Litoral	www.unl.edu.ar
	Universidad Nacional del Nordeste	www.unne.edu.ar
	Universidad Nacional del Noroeste de la Provincia de Buenos Aires	www.unnoba.edu.ar
	Universidad Nacional del Sur	www.uns.edu.ar
	Universidad Tecnológica Nacional	www.utn.edu.ar
	Pontificia Universidad Católica Argentina	www.uca.edu.ar
	Universidad Atlántida Argentina	www.atlantida.edu.ar

	Universidad de Centro Educativo Latinoamericano	www.ucel.edu.ar
	Universidad Abierta Interamericana	www.vaneduc.edu.ar
	Universidad Adventista del Plata	www.uapar.edu
	Universidad Argentina de la Empresa	www.uade.edu.ar
	Universidad Argentina John F. Kennedy	www.kennedy.edu.ar
	Universidad Austral	www.austral.edu.ar
	Universidad Blás Pascal	www.ubp.edu.ar
	Universidad CAECE	www.caece.edu.ar
	Universidad Católica de Córdoba	www.uccor.edu.ar
	Universidad Católica de La Plata	www.ucalp.edu.ar
	Universidad Católica de Salta	www.ucasal.net
	Universidad Católica de Santa Fe	www.ucsf.edu.ar
	Universidad Católica de Santiago del Estero	www.ucse.edu.ar
	Universidad Champagnat	www.uch.edu.ar
	Universidad de Belgrano	www.ub.edu.ar
	Universidad de Ciencias Empresariales y Sociales	www.uces.edu.ar
	Universidad de Congreso	www.ucongreso.edu.ar

	Universidad de la Fraternidad de Agrupaciones Santo Tomás de Aquino	www.ufasta.edu.ar
	Universidad de la Marina Mercante	www.udemm.edu.ar
	Universidad de Mendoza	www.um.edu.ar
	Universidad de Morón	www.unimoron.edu.ar
	Universidad de Palermo	www.palermo.edu
	Universidad del Aconcagua	www.uda.edu.ar
	Universidad del CEMA	www.cema.edu.ar
	Universidad del Norte Santo Tomás de Aquino	www.unsta.edu.ar
	Universidad del Salvador	www.salvador.edu.ar
	Universidad Empresarial Siglo 21	www.uesiglo21.edu.ar
	Universidad Favaloro	www.favaloro.edu.ar
	Universidad Juan Agustín Maza	www.umaza.edu.ar
	Universidad Maimónides	www.maimonides.edu.ar
	Universidad Notarial Argentina	www.universidadnotarial.edu.ar
Research organizations (public and private)	There are no specific research organizations for the IT sector. All the research is being done by Universities	
Entities participating in R&D projects		
• Entities participating	*Probably most of the Argentinean universities*	

in international R&D projects	*have some kind of participation in international R&D projects, as it is a requirement for accreditation. There is no specific and organized information about this specific data*	
• Entities participating in national/regional R&D projects, that don't participate in international projects	*Probably most of the Argentinean universities have some kind of participation in national/regional R&D projects, as it is a requirement for accreditation. There is no specific and organized information about this specific data*	
Other reference institutions from the research community		

SWOT analysis of national ICT policies (detailed description)

Strengths:

1. A huge number of higher education institutions devoted to ICTs

   Argentina's educational system offers 243 IT degrees, of which 117 are at the technical or junior college level and the other 126 are at the engineering level. With almost 70,000 students enrolled at university in informatics, the number of new enrollments every year is slightly over 15,000 (5% of total new enrollments). The number of IT students has been growing steadily since the early 1990s. Currently, the government is implementing a set of programs to keep up with the surging demand for qualified labor in the sector.

2. The education offered by those institutions is very good

   The graduated professionals are usually very demanded by industry and, furthermore, there is an ongoing accreditation process based on standards defined by the National University Evaluation and Accreditation Commission (CONEAU) and the Engineering Deans Confederation (CONFEDI)

3. Almost 50 years training ICTs human resources

   The first Computational Science Career was created in 1962 at the University of Buenos Aires (UBA)

4. Openness to the world

   Leading international firms such as IBM, NEC and Siemens have a longstanding presence in the country. Other firms such as Google, Intel, Motorola and Sabre Holdings are the vanguard of the new wave of arrivals.

5. Strong participation in the Internet business, especially in the Spanish speaking world

   An internationalization process is already in motion, with almost 100 firms' offices abroad and 15,000 workers serving offshore markets. In fact, 6.7% of domestic firms have at least one branch abroad, and this portion is growing steadily.

6. A fast growing ICT business sector

   In Argentina, the software and IT services industry is growing at a much faster rate than the economy as a whole. This dynamic sector has shown an outstanding performance, with annual growth rates of 20% in sales and 23% in exports since 2002. This industry offers a high-value opportunity to help grow the Argentinean economy, as it is a key driver of productivity throughout the economy.

Weaknesses:

1. The lack of ICT policies

   As it was clearly described along this document there is no formal ICT policy in our country. There are some instruments to promote this sector. Nevertheless, there is an E-Government Plan which is the most important policy regarding ICT. In Argentina, there is no uniform and global ICT policy for the whole public sector, like those in practice in the EU.

2. The lack of a good statistical information system about the ICT sector

   It is very well known, especially at the national level but also at the international one, that the official statistics in Argentina are not very trustworthy. This is especially evident in the ICT field where is very difficult to find proper data.

3. The lack of coordination between actions of various public organizations

   There is no government agency in charge of national ICT issues. There are several agencies (ONTI, MINCYT, SECOM, etc.) working in different and usually not coordinated actions

4. The lack of coordination between actions of public organizations and private corporations

   There is no government agency in charge of national ICT issues. Some efforts have been done between local ICT commerce chambers and some government already mentioned in this report.

5. Communications infrastructure badly distributed through the country

   There is a very good communications infrastructure in the main cities, its suburbs and in the middle part of the country (the corridor Buenos Aires, Rosario, Córdoba, Mendoza) but there are severe problems with this infrastructure in the north and south part of the country

Opportunities:

1. Good exchange rate

   Since 2002, after the severe economic crisis that took place in Argentina at the end of

2001, the exchange rate between dollar and Argentinean peso changed from an absolute parity into a relation of 1 to 3. Even though that situation has changed during recent years, the present relation of 1 to 4 is still a good opportunity for international business in general and specifically in the ICT sector.

2. Linkage with ICT professionals living outside our country

   There is an important program to bring back Argentinean scientists and researchers that are working outside the country. The program is called RAICES (roots)

3. High cable (video), Internet and mobile telephony penetration rate

   As it was clearly stated in this report, Argentina has one of the highest mobile subscribers rate in Latin America and Internet penetration is increasing rapidly, well above the region's average.

4. Fast growing ICT global market

   A key sector in the global economy technology represented a US$1.5 trillion business in 2007 and is expected to steadily grow in importance. The main components are IT services (US$ 470 billion), hardware ($460 billion), business process outsourcing (BPO, US$ 420 billion), and software (US$230 billion). The software and IT services sector has an associated R&D and engineering market of US$700 billion.

5. Argentina is considered a qualified software producer

   Argentina's educational level is similar to developed countries and is well above the educational standards of other Latin American countries. Specifically, Argentina is endowed with a pool of highly skilled professionals specialized in technology and informatics, with socio-economic and cultural backgrounds similar to those in industrial economies.

6. Digital TV service launching

   Right at this moment (June 2010) Argentina is launching its Terrestrial Digital TV service. This means a very significant opportunity for hardware (set top boxes and TVs) producers and also for software developers

Threats:

1. Political instability

   Even though Argentina is nowadays counting 27 years of continuing democracy, after long periods of periodic changes between dictatorial and democratic governments, there is still an important and pitiful culture of corruption and lack of respect to the laws that turns into political instability

2. Legal uncertainty

   The rules (including laws and decrees) are, more often than desirable, changed and not respected. Due to this fact, Argentina is very badly ranked in the competitiveness international rankings.

3. Poor private investment

   The private investment ratio in recent years have reached a 20% and this is an important fact having in mind that this number was only 10% after the crisis of 2001-2002

4. The number of ICT related graduates is less than the number required by the industry

There is a lack of ICT professionals in Argentina. This situation is a consequence of two factors: the growth of the ICT sector and the relatively poor interest of young people to study ICT careers (considered “hard” and difficult care

ANNEX V – Issues regarding ICT policies analysis in Mexico

Documents related to current ICT policy

CURRENT ICT POLICY	
Document name	*Science, Technology and Innovation Special Program (Programa Especial de Ciencia, Tecnología e Innovación 2008-2012)* http://www.conacyt.mx/comunicacion/comunicados/47-08.html *Aims to strengthen the social appropriation of knowledge and innovation, as well as effective coordination of all involved parties to achieve that end.* *Mexico´s Great Vision Project 2030 (Proyecto de Gran Visión México 2030)* http://www.vision2030.gob.mx/ *National Development Plan 2007-2012 (Plan Nacional de Desarrollo 2007-2012)* http://pnd.presidencia.gob.mx/ *National Infrastructure Program 2007-2012 (Programa Nacional de Infraestructura 2007-2012)* http://www.infraestructura.gob.mx/
Legal bases	*Indicate related legislation* *Law of Science and technology, new law published in Diario Oficial de la Federación on June 5, 2002,* *Last reform published OG 27/04/2010* *(*http://www.cddhcu.gob.mx/LeyesBiblio/pdf/242.pdf*)*
Policy goals	1. *Regular supports that the Federal Government is obliged to grant to stimulate, strengthen, develop and strengthen scientific research, technological development and innovation in general in the country. The restructuring and strengthening of public policy in terms of knowledge and innovation are essential to create conditions for achieving higher levels of economic growth.* [1/] 2. *The development socially balanced and sustainable*

	change requires a growing activity with the coordinated participation of all the National Science and Technology (SNCYT), plus a sufficient public and private financing. [1/] 3. *The National Development Plan (NDP) sets out the national objectives, general strategies and development priorities that should govern government action, so that the country has a clear direction and leadership. In this great challenge of working towards common goals, the NDP intends to organize all efforts around five lines of thought and action. In the line 2, "Competitive economy and generating employment," science, technology and innovation play a major role as strategic variables change structural development of the country.*[1/] 4. *Establish mechanisms for coordinating activities between departments and agencies of the Federal Public Administration and other institutions involved in defining policies and programs in scientific, technological and innovation, or carrying out such activities directly.*[1/] 5. *Create the bodies and coordination mechanisms with the governments of the states, as well as involvement and participation of the scientific and academic community of higher education institutions, public sector, social and private generation and policy formulation promotion, dissemination, development and application of science, technology and innovation, and to train professionals in these areas.*[2/] 6. *Link to the educational, productive and service sectors in scientific research, technological development and innovation* [2/]
Priority lines [4/ 5/]	• *Networking IT Exchange. The instruments used to support the previous ICT policy are still valid during the present one. Most of these instruments have the intention to strengthen the ICT industry through the elimination of importation tariffs on raw material or other inputs used in the ICT industry, stimulating the investment in electronic industry in Mexico, or the creation of clusters or new ICT companies. New instruments were additionally created for the present ICT policy to foster innovation and collaboration between industry and research centers, but these are not sector specific. Until now no special instrument or fond on a national level exists related to support research in ICT. The funds used for this purpose are the ones from the General Fund for Basic Research "Fondo Sectorial de Investigación para la Educación" SEP-CONACYT.* • The sector related national instruments are: • Sector Program "**Programa de Promoción**

	Sectorial (PROSEC)" gives appliances producers of a wide range of industries, including electronics, benefit through the elimination of custom duties or preferential duties on imports of raw materials, inputs and components, [8/]. This program exists since 2000, an extension of this program is presently under negotiation. • Program of tariffs for the competitiveness of the electronics industry and high-tech economy called **ITA-Plus:** Published in 2002, this program eliminates or reduces custom duties on on a wide range of components and products in the electronics and information technology industries.[8/] • Competitiveness Program of the Electronics Industry and High Technology **"Programa de Competitividad de la Industria Electrónica y de Alta Tecnología (PCIEAT)**":Published in 2002, it seeks to offer the conditions necessary for electronics industry to establish in Mexico. The program intends to recover global competitiveness and to consolidate the country as the centre of the electronics industry in the Americas.[6/]. 1. Evolution and current strategies to promote competitiveness: 1. Competitive tariff structure 2. To make foreign trade processes more efficient 3. To develop a standardizing and regulating framework 4. To develop supplying chains 2. Strategies to strengthen this sector: 1. Competitive fiscal policies 2. Promotion of technological development 3. Promote the skilled labor force 4. Create an appropriate infrastructure 5. Own competitive operational and macro-economic environment • National Program Gazelle Firms **".Programa Nacional de Empresas Gacela**":Published beginning 2009, the program aims at identifying high-growth companies with dynamic growth in sales and employment generation on the average, with capabilities to innovate and to compete in international markets and strengthen the domestic market with international standards. The program supports technology-based and not technology Mexican's MSME's to grow rapidly through comprehensive support in order to create jobs and increase sales in local market.[10/] • Program for the Development of Software Industry

	"Programa para el Desarrollo de la Industria de Software (PROSOFT)": Launched in 2002, initially it focused on software industry, but since 2004 it covers the whole IT sector. This program promotes national economic development through the provision of support for projects that encourage the creation, development, consolidation, viability, productivity, competitiveness and sustainability of companies of information technology (IT). [8/] The PROSOFT fund became operational in 2004 with government funding of 12.8 million USD. This figure increased in 2005 to 17.7 million USD and the Federal budget allocation increased to 42 USD million in 2006. The following years the program experienced a constant budget reduction, for 2010 around 29 USD million are provided, which represents nearly the half of the budget assigned for 2007. • The Program's goals for 2013 are: 1. Achieve an annual production of software of $ 5,000 million. 2. Achieve the global average spending on information technology. 3. Convert Mexico in the Latin American leader in software development and digital • **Technology Business Accelerator (TechBA):**TechBA is a program created by the Mexican Ministry of Economy and operated by The United States - Mexico Foundation for Science. TechBA's mission is to find the most innovative technology-based companies and take them to global markets. • To accomplish that, TechBA has branches in some of the most innovative ecosystems in the world such as: Silicon Valley, Austin, Montreal, Madrid, Michigan and Arizona. TechBA works with companies from Information Technology and Telecommunications, Automotive, Aerospace, Food, Advanced Materials, Alternative Energy, Multimedia, Animation and Video Games and Life Sciences. [11/] • *Promote technological innovation with tax incentives for businesses.* • *Implement processes of planning and control of technological projects.* • *Promote market orientation involving the consumer in the process of developing the service price.* • *Develop a management style based on the leadership and commitment to human capital development organizations* • *<u>Short term:</u>*

	• *To assess the impact and efficiency of science and technology expenses.* • *Define priorities and strategic sectors in terms of S&T considering as basic criteria the concrete social challenges and opportunities in terms of a social and economic development of the country.* • *Integrate such priorities under the strategic definition of the economic and social policies of the government and revise, based on that, the schemes and amounts of financial aid, institutional architecture and the specific politic instruments needed to achieve such objectives.* • *<u>Medium term:</u>* *4. Comprehensive educational reform capable of supporting the development of human capital (researchers) needed for scientific and technological growth.* *5. Creation of rules and incentives that link the investment in science and technology with economic profitability of the productive sectors activities.* *6. Active promotion of a culture which underpins the broad social value of knowledge, innovation and technological development.* *In the 2007-2012 Communications and Transport Sector Program medium term activities are defined in order to meet the primary objective of the National Development Programs and the goals of the National Infrastructure Program.* *increase coverage, quality and competitiveness of the infrastructure, thereby contributing significantly to reduce inequalities and regional imbalances in the country* • *at the end of the administration of President Calderón, Mexico will be located as one of Latin America leaders and improve its competitive position internationally.* • *Therefore, the strategies discussed are:* *a) expand the coverage and accessibility of communications and transportation in all of their modes and services;* *b) to modernize, diversify and connect the existent infrastructure* *c) provide safer, affordable and high quality services*
Ministry coordinating the policy	*Conacyt* http://www.conacyt.mx

	Secretaría de Comunicaciones y Transporte (SCT) http://www.sct.gob.mx/ Ministry of Economy. (Secretaria de Economía, SE) http://www.economia.gob.mx *Comisión Federal de Telecomunicaciones (COFETEL)* http://www.cofetel.gob.mx
Start / end date	2008-2012
Policy scope	*The National Development Plan 2007-2012, declared the need to create conditions such that Mexico is inserted into the forefront of technology and to boost its competitiveness. New technologies have not only brought significant progress in all fields of human activity, but are essential to achieve greater production of goods and services in all sectors of the economic activity.*[3/] *One of the many objectives stated in the National Development Plan 2007-2012 is the creation of a competitive economy with high growth rates and capable of generating good-pay jobs for Mexicans. With that purpose, three strategic lines are defined: increase both capital and labor's productivity through technological innovation, increase investment in order to equip companies and workers with better and more productive tools, improve people's capabilities through an increase of the education's quality.* [3/] *In the Science, Technology and Innovation Special Program (Programa Especial de Ciencia, Tecnología e Innovación 2008-2012) the following objectives are declared:* *1. Establish state policies in the short, medium and long term that will strengthen education, basic and applied science, technology and innovation: Such state policies seek the creation of conditions for a steady development and improve living conditions of Mexicans. An essential component is the articulation between academic and research sector with the productive sector.*[1/] *2. Define more clearly the priorities for research. Decentralize the scientific and technological innovation activities in order to contribute to regional growth, the study of local needs and the development and design of appropriate technologies to boost production in different regions of the country.*[1/]

	3. Promote increased funding for basic and applied science, technology and innovation.[1/] *4. Increase investment in scientific infrastructure, technology and innovation.*[1/] *5. Assess the implementation of public resources to be invested in training scientists and technologists, as well as for tasks of scientific research, technological development and innovation.* [1/] *Governments recognise ICTs' potential as a major driver of innovation and economic growth across industries* [3/]*. Strategies are:* • *Information technology education for individuals* • *Choose business and industry* *Long-term aim of valid research policy is to invest there until 2025 more than 2% of GDP in research and development and world counted are developed the most in science and technology to 20 countries. As a result of this long-term policy is expected worldwide one of the Mexican economy under the 10 most important*
ICT sub-sectors addressed	*Select from: IT components; IT equipment; Telecom and multimedia equipment; Telecom services; Computer services and software*
Total budget	The policy itself has no budget. Budget is assigned through the National Council for Science and Technology for operation and research funding. This Council does not count with a specific ICT research funding program. The Federal Economy Ministry has special sectorial programs indicated below with their specific budget assigned. These programs have a character of support to companies and sometimes support for innovation projects, but do not include research.
Budget assigned to the selected sub-sectors [6/] and the information provided only for the year 2010	*IT components:____NA_____* *IT equipment:____NA_____* *Telecom & multimedia equipment and Telecom services: $346.15 millions dollars* *Computer services and software: $52.9 thousand dollars*
Reference to national/regional cooperation	*Yes/No*
• ICT sub-sectors where cooperation activities exist [7/,8/]	*If yes, detail ICT sub-sectors*

	• *Sectorial Program (PROSEC)* • *ITA-Plus* • *Competitiveness Program of the Electronics Industry and High Technology (PCIEAT)* • *National Program Gazelle Firms* • *Program for the Development of Software Industry (PROSOFT).*

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2. Ministry of Economy, Programa para el Desarrollo de la Industria del Software (PROSOFT), Mexico, D.F.

3. Special Science and Technology Program (PECyT) 2001-2006, www.siicyt.gob.mx/siicyt/docs/acerca.../pecyt%202001_2006.pdf; or http://dct.cicese.mx/cuaderno.pdf

4. Program of tariffs for the competitiveness of the electronics industry and high-tech economy (ITA Plus)

a. www.siicex.gob.mx/portalSiicex/SICETECA/.../04092002.doc

5. Federal Government, (2001); Plan Nacional de Desarrollo 2001-2006; http://pnd.fox.presidencia.gob.mx/

6. Conacyt, Programa Nacional de Ciencia y Tecnología 2001-2006; http://dct.cicese.mx/cuaderno.pdf

7. http://www.prosoft.economia.gob.mx/acercade.htm

8. MOITI; (2007); Mexican Information Technologies Industries, December.

Full list of the main stakeholders in the ICT field

ICT associations

Cámara Nacional de la Industria Electrónica, de Telecomunicaciones y Tecnologías de la Información (CANIETI) http://www.canieti.org/: The Mexican Electronics Telecommunications and Information Technologies Industries Chamber has more than 25 years in Mexico and is an entity representing the Electronics, Telecommunications and Information Technology Sector, which promotes the development of said sector in a global environment with high quality services. Their main objective is to achieve the competitive development of the National Industry with a guild sense and social responsibility.

Asociación Mexicana de la Industria de las Tecnologías de la Información (AMITI) http://www.amiti.org.mx: AMITI is a private organization created to position Information Technology as the key ingredient to Mexico's competitiveness, promoting the industry's growth by seeking a regulatory and legal framework which facilitates business development. AMITI, The IT Industry Mexican Association was initially founded in 1985 as the SW Industry Association. . Its.

Red Tematica TIC Conacyt http://www.redtic-conacyt.mx/: The thematic network on ICT

promotes the collaboration between researchers in academic institutions, research centres and entreprises. The last in strategic areas in order to reach structured and articulated national development. This network is currently made up by an academicals-technical committee whose members were responsible for the proposed mining project.

La Corporación Universitaria para el Desarrollo de Internet (CUDI) www.cudi.com.mx: CUDI is the association that manages the project from the Internet 2 in Mexico and seeks to promote the development of applications using the network and develop collaborative research projects and education among its members. Currently is integrated by universities, research centers of the country and some companies that support this kind of research. CUDI network has an infrastructure of over 8,000 kilometers of high-capacity links that operate at a speed of 155 megabits per second covering the entire national territory.

Funding Agencies

Consejo Nacional de Ciencia y Tecnología (CONACyT)-http://www.conacyt.mx/
The National Council for Science and Technology was established by order of H. Congress on December 29, 1970, as a decentralized public entity of the Federal Public Administration, member of the Education Sector, with legal personality and own patrimony. It is also responsible for drawing up policies for science and technology in Mexico.

Secretaría de Economía -http://www.economia.gob.mx/
Is known in Mexico for the Prosoftware founds oriented towards SMEs. It is the federal agency that promotes the generation of quality jobs and economic growth in the country through the promotion and implementation of public policies that detonated the competitiveness and productive investment.
It has representative offices that offer information and advice to entrepreneurs, both domestic and foreign, who wish to export, import and invest in different countries.

Secretaría de Comunicaciones y Transportes (SCT)-http://www.sct.gob.mx/coordinacion-de-la-sociedad-de-la-informacion-y-el-conocimiento/-
It is a unit designed to secure the transport infrastructure and modern communications to help develop the country sustainable preserving the environment and security. The SCT, through the Coordination of Information Society and Knowledge (CSIC), develops a national broadband network with the intention that the Community Centers provide access to Internet content that, because of their complexity, require connections higher quality for video applications consulting, voice and data.

Higher Education institutions

Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM)- http://www.itesm.mx
Having 33 campus all around Mexico, has promoted the development in ICT by developing academic programs, research and development for the country. Grouping its 33 campus, it has the most important ICT faculty in Mexico

Universidad Nacional Autónoma de México,- http://www.unam.mx/
The Mexican National University has different faculties, research centers and institutes that promote the development and research in ICT.

Universidad Autónoma Metropolitana --www.uam.mx

UAM, Metropolitan University in Mexico City, performs research and technological development in Mexico. It promotes undergraduate and graduate studies as well as research in different ICT fields.

Instituto Politécnico Nacional www.ipn.mx-
It is a high-level educative institution of the public sector; its activities began in 1936. At the moment, it counts on 77 academic units, located in 15 organizations and 22 localities of the Republic –

Research organizations (public and prívate)

Centro de Investigacion en Matemáticas www.cimat.mx
Founded 27 years ago, the CIMAT is one of Mexico's most important research centers. The constant search to achieve a balance between basic and applied mathematics.-

Centro de Investigación y Estudios Avanzados del Instituto Politécnico Nacional (Cinvestav-IPN) -www.cinvestav.mx
CINVESTAV-IPN is one of the leading centers in Mexico related to basic research in many scientific areas. Its first division is in 4 areas: Biological Sciences, Exact Sciences, Engineering and Social.

Centro Nacional de Investigación y Desarrollo Tecnológico (CENIDET)- www.cenidet.edu.mx
The CENIDET offers programs Masters and Doctorate of Science in Computer Science. The programs are structured with the purpose of enabling development in areas such as:

- Technology-based industry
- Research institutions or technological development
- Schools for training engineers.

The Center offers the opportunity to conduct research in collaboration with other institutions such as the Electric Power Research Institute and the Centre for Energy Research, there are also important agreements with foreign universities and institutes, including the University of Oviedo in Spanish, The University Concepción of Chile, Universidad Politécnica de Madrid, Federal University of Santa Catarina in Brazil, the Virginia Polytechnic Institute and the University of Texas A & M.

Clusters

Prosoftware http://www.prosoftware.org.mx/: ICT Cluster at Mexico City. It's the first association founded at Mexico City. The principal objective is to promote activities, access to local and federal governmental founds and the association with other stakeholders.
Monterrey IT Cluster http://www.piit.com.mx/: CANIETI, AETI, and ANADIC, together with the Citizens' Council of Software Industry of Nuevo Leon have created the Software Cluster, which will be located in a building where 42 software companies from the State will have their operational base, employing more than 1000 software development engineers. The following are some of this association's objectives:

- The integration of small and medium enterprises (PYMES) and the collaboration of Nuevo Leon's software industry.

- The development of the necessary infrastructure in order to be internationally competitive.

Software Centre http://www.centrodelsoftware.com.mx/: The software centre, is one of the most important infrastructure projects in the country. Founded in 2006, has been consolidated as one of the most important IT clusters in national competitiveness. Having founds coming from federal and regional governments. It has more than 35 organizations and more than 700 employments.

Companies of the ICT sector

IT Components

Intel Tecnología de México, S. A. de C. V. www.intel.com .
Build systems, research IT topics, and processors for different business. Have presence in the entire world, they make global investments in emerging technologies. Create consumer-centric models of care as well as the potential to improve the quality, cost, and accessibility of healthcare services.

Compañía General de Electrónica, S.A de C.V.www.cge.com.mx
Compañía General de Electrónica (NG), was founded in 1960 to manufacture electronic and electromechanical components. NG is the world leader and largest manufacturer of Electrolytic Aluminum AC Motor Start Capacitors. It has developed a complete line of dry motor run capacitors for use in general purpose motors, pumps, HVAC systems, fans, blowers, etc.

Electronica Steren, S.A. de C.V.www.steren.com
Steren is an international electronics manufacturer of record with offices in San Diego, California, and Miami, Florida, and Shanghai, China, as well as production facilities in the U.S., Mexico and throughout East Asia. It is an international business, founded in Mexico City in 1956.

IT equipment

Cisco Systems de México, S. A. de C. V.www.cisco.com
Cisco Systems is the worldwide leader in networking for the Internet. The Cisco networking solutions base on Internet protocol (IP), and are a basic part of the Internet and corporate networks, educational and government worldwide. Today, with more than 47,000 employees worldwide, continues with the innovation in products and industry-leading solutions. The main areas of the company are routing and switching, moreover in advanced technologies such as: IP communications, Wireless, Home Conectivity, Network application services, Network security and Video Systems.

Hewlett-Packard México, S. de R. L. de C. V.www.hp.com
Hewlett-Packard, also known as HP, is one of the largest companies in information technology in the world, based in Palo Alto, California. It manufactures and market hardware and software as well as providing support services related to computer science. The company was founded in 1939 and was engaged in the manufacture of electronic measuring instruments and laboratory. HP focuses on three technological advances in order

to transform the life of the business which is: data center for next generation, mobile computing with persistent connection and print and image processing.

Dell México, S.A. de C.V.www.dell.com.mx

DELL is one of the two largest computer hardware manufacturers worldwide. It was founded by Michael Dell in 1983. In march of 2004, began with the multimedia product market and to sell televisions, and digital media players, also introduce Dell printers for domestic use and small offices. Dell has presence in 44 Latin American economies, with over 20 years in the market has approximately has 52 retailers, 12 countries and just over 3,400 stores. Dell expands its sales channel to reach all types of consumers.

IBM de México Comercialización y Servicios, S.A. de C.V.http://www.ibm.com/mx/es/

IBM is a multinational company that manufactures and sells tools, programs and computer-related services. IBM is headquartered in Armonk (New York, USA) and consists from 15 June 1911, but has been operating since 1888. With about 390,000 employees in nearly 161 countries, the company has revenues of $103 600 billion in 2008, IBM is the company of information technology services in the world's largest and one of the few that has been operating since the nineteenth century to today. It has presence in all segments related to information technologies, in fact, in recent years; more than a half of its revenues come from the area of consulting and services.

J.R. Electronica, S.A. de C.V. www.interfonos.com.mx
Is a 100% Mexican company specializing in the field of Intercom, Video Intercom, C. C. T. V., DVR, Web Server, Private Intercom System, Central Hospital Sick - Nurse Digitized and sound systems. They began with intercom home computers for buildings, housing complexes and private systems for factories and offices with open and close voice. In the last year introduce articles for monitoring the internet such as DVD cards, digital video recorders and Web servers.

Telecom Services

Alestra, S. de R.L. de C.V.www.alestra.com.mx
Alestra is one of the leading provider of telecommunications services in Mexico, primarily focuses on multinationals, large and small domestic companies and institutional clients. Through its fiber optic network and its wireless network, provides network solutions and next generation advanced IP services like data, Internet, managed services, security and hosting services as well as local and international long distance. Alestra's network provides connectivity to 199 cities in the country through more than 6,700 kms. fiber and makes possible a transparent access to the World Network of AT & T. The Internet Alestra was the first of a telecom operator to be certified with the "Cisco Powered Network", issued by Cisco Systems. Alestra social capital is predominantly national. Alfa owns 51.0% share, while AT & T owns the remaining 49.0%. Mr. Armando Garza Sada holds the presidency of the Governing Council and Mr. Rolando Zubirán Shetler is the President and CEO of the company.

Eads Telecom México, S.A. de C.V.www.eads.net

Eads is a global leader in aerospace, defense and related services. They operate in the worldwide, over every continent. Some of their strategies include maintain and develop intrinsic skills and technologies for the architecture and integrations of platforms and platform- based systems.

Iusacellwww.iusacell.com.mx/
Is the first mobile company in the country with third generation 3G technology CDMA EDVO. Iusacell brings with the mobile broadband (BAM) the only way of wireless internet in Mexico. Derived from the merger with Unefon, the new company conform approximately 8% of income from mobile phone market in Mexico with sales in excess of Ps. 11.000 million and EBITDA of Ps 2,000 million. The competitive Intelligence Unit reported its market share in lines equivalent to 4.3%. The company has national coverage, and includes the only two providers of wireless communications services in the country with CDMA technology, which generates the most efficient use of radio spectrum.

Telefónica Mexico (Movistar) www.movistar.com.mx
Movistar is an international brand wich has a presence in 13 countries. In Mexico, Movistar has more than 18.2 million customers across the country (including fixed, mobile, public and data), the total number of mobile customers is 17.8 million users at end-March 2010 and has solutions communication for each specific niche market: users of prepaid, contract and business. They have over 260 439 fixed lines, through which is positioned in the market as "movistar at home." Telefonica Mexico reached over 81 thousand 500 people and more than 71 000 km highway, which represents coverage throughout the country. The company has operations in 25 countries on three continents. Telefónica Group has a presence in all key markets in Latin America and is number one or two in all the countries where it operates.
The group's shares are traded on the Spanish (Madrid, Barcelona, Bilbao and Valencia) and on stock exchanges in London, Paris, Frankfurt, Tokyo, New York, Lima, Buenos Aires, Sao Paulo.

Unefon www.unefon.com.mx/index.
Is a company that restart operations this year in Mexico t and It Works with Iusacell, currently offers telephone services focused on unit rates in Mexico an in the U.S

Avantel/Axtel http://portal.avantel.com.mx/
AXTEL is the second largest integrated services of fixed telephone in Mexico and one of the leading operators of virtual private networks in the country. Services AXTEL include fixed wireless, long distance and international, as well as advanced solutions for voice and data, web hosting, information security, virtual private networks (VPNs for its acronym in English) and a full range Internet service, among others. Its value-added solutions on IP technology enable convergence of services, including voice, data and images. It employs over 8,000 people in 39 cities in the nation.
It has six international departures to the global network of Internet transmission (Tijuana, Mexicali, Ciudad Juarez, Nuevo Laredo, Reynosa and Cancun).
At the end of September 2009, AXTEL recorded voice lines of 940 000 and 147 000 subscribers of broadband internet. Listed on the Mexican Stock Exchange since December 2005, on February 2008 their titles are part of the Price and Quotations Index (IPC).

Telmex www.telmex.com

This company controls arround 80% of the market for fix telephones, is the leading telecommunications company in Latin America, with operations in Mexico, Argentina, Brazil, Colombia, Chile, Peru and the United States. It has invested some 29 billion dollars during the period 1990-2005, to ensure the growth and modernization of its infrastructure, developing a 100% digital technological platform that operates a fiber-optic networks worldwide advanced and includes connections via submarine cable with 39 countries.
Carso Global Telecom owns the majority shares of control of Telmex and America Telecom has the most control actions of America Movil, a leading provider of wireless services in Latin America.
Grupo Carso takes control of Carso Industrial (Condumex, Porcelanite, Nacobre and Cigatam, among others) and Carso Comercial (Sears, Sanborn, Promotora Musical, among the most important). On the other hand, operates Grupo Financiero Bank consisting of Inbursa, Seguros Inbursa, Casa de Bolsa stock market investors, Inbursa Leasing and Afore Inbursa, among other companies, and U.S. Commercial Corp., which is the holder of CompUSA shares. Group companies directly employee over 160 thousand people.

Telcel www.telcel.com
This company summons 4 times more users than its nearest competitor. In 1984 they obtain the concession to exploit the mobile radiotelephone service in the Metropolitan Area of Mexico City under the name "SA DE CV DIPSA Radiomovil. Following on from 1990 expands cellular services in the Federal District and metropolitan area and gradually offer the service nationwide.

Nextel www.nextel.com.mx
Nextel acquired in 1996 Mobilcom Corporation, one of the distributors of Mobilcom is Tricom Network S.A. of C.V. It currently operates in over 68 cities in the Mexican Republic offering four digital services on a single equipment: Direct connection, telephone network access, messaging, Nextel online. With the most important digital Network of the United States and a large presence in several countries including Argentina, Brazil, and Peru, Nextel company becomes the largest wireless communications in the Western Hemisphere and is in the process of becoming the global market for wireless communications. Nextel de Mexico uses iDEN technology (Integrated Digital Enhanced Network), integrated services digital network developed by Motorola radio. The same technology that is used by the most prestigious media companies around the world.

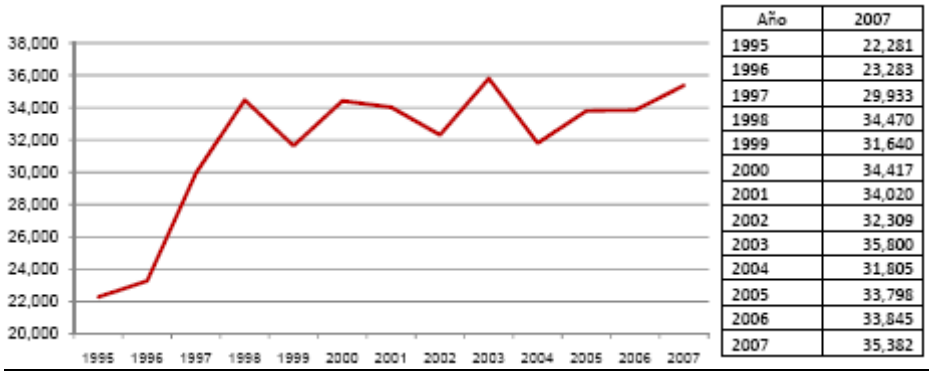
Budget of the National Council for Science and Technology

Budget administered by the National Council for Science and Technology by activity, 1990-2007 (thousands of pesos)[61]

[61] Source: INEGI
http://www.inegi.org.mx/est/contenidos/espanol/soc/sis/sisept/default.aspx?t=etec05&s=est&c=9104

Year	Total	Research and Experimental Development	Technological and Scientific Services
2000	2 988 993	1 539 331	215 208
2001	3 422 281	1 882 254	273 782
2002	4 491 410	2 470 276	359 312
2003	5 076 679	2 976 492	481 018
2004	5 029 390	2 654 530	475 556
2005	5 032 800	2 656 300	475 900
2006	5 510 728	2 735 277	505 553
2007	5 780 683	2 643 891	502 844

Federal spending on science and technology 1995-2007 (thousands of pesos)[62]



Año	2007
1995	22,281
1996	23,283
1997	29,933
1998	34,470
1999	31,640
2000	34,417
2001	34,020
2002	32,309
2003	35,800
2004	31,805
2005	33,798
2006	33,845
2007	35,382

[62] Source: Statistical acquis Scientific and Technological Consultative Forum (Acervo Estadístico del Foro Consultivo Científico y Tecnológico)
http://www.foroconsultivo.org.mx/documentos/acertadistico/indicadores_de_gasto_en_ciencia_y_tecnologia.pdf

Expenditure on S&T at selected countries (Million USD)[63]

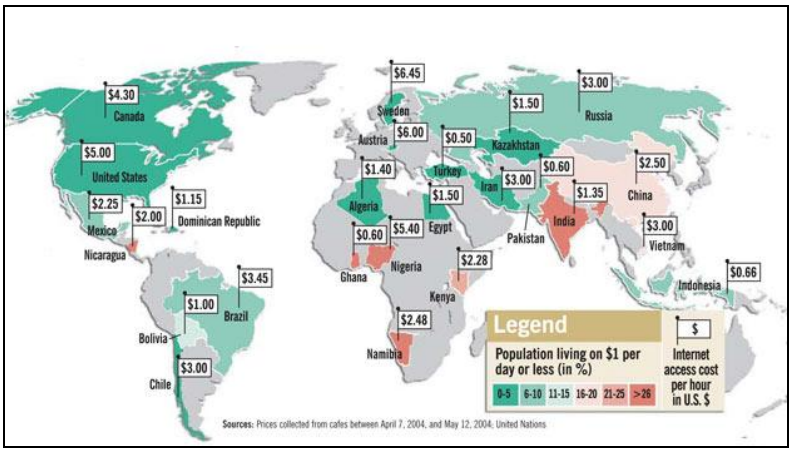
		2000	2001	2002	2003	2004	2005	2006	2007
Argentina	STA[64]	1,430.0	1,290.2	453.3	600.7	750.7	963.1	1,233.9	1,593.2
Bolivia	STA	47.2	46.0	42.8					
Brazil	STA	8,327.1	7,329.0	6,599.9	6,952.6	8,218.5	11,204.9	13,967.2	19,201.9
Chile	R&D[65]	394.9	360.1	458.2	493.4	644.7			
Colombia	STA	289.0	256.0	281.4	321.4	447.0	662.8	667.0	683.5
Costa Rica	STA	147.6			147.0	185.4		284.0	313.4
Ecuador	STA		31.2	41.7	49.1			84.8	99.7
Spain	R&D	5,282.8	5,577.5	6,791.1	9,286.3	10,888.6	12,746.1	14,822.0	18,163.9
Guatemala	STA	0.6	0.7	0.6	0.4	0.9	12.2	17.4	23.0
Mexico	STA	2,424.3	2,568.3	2,523.2	2,716.6	2,532.4	2,875.1	3,008.6	3,237.7
Panama	STA	101.6	116.1	104.0	95.1	128.2	108.5	115.6	99.4
Peru	STA	683.4	779.8	803.0	700.6				
United States	R&D	264,634.0	274,211.0	276,434.0	283,795.0	312,068.0	323,546.0	342,886.0	367,297.5
Uruguay	STA			34.5					142.8
Venezuela	STA	440.4	609.6	396.1	258.7	278.8	499.8	3,277.8	6,130.0
Latin America & Caribbean	STA	14,950.1	14,192.1	12,455.7	13,049.2	14,919.9	19,410.7	26,325.1	37,693.6

[63] Source: Red de indicadores de Ciencia y Tecnología (RICYT).
http://www.ricyt.org/interior/interior.asp?Nivel1=1&Nivel2=2&Idioma=ENG
[64] Scientific and Technological activities
[65] Research and Development

Comparation of prices for telecom services

International prices for telecommunication services

Country	Rate in U.S.$/ho
Austria	$6.00
Azerbaijan	$1.10
Bolivia	$1.00
Brazil	$3.45
Chile	$3.00
Colombia	$3.00
Cuba	$1.50
Dominican Republic	$1.15
Guatemala	$1.50
Japan	$7.50
Mexico	$2.25
Nicaragua	$2.00
Panama	$2.00
Philipines	$2.00
Singapore	$5.00
Sweden	$6.45
United Kingdom	$7.00
United States	$5.00



Price collected from carriers between April 7, 2004 and May 12 2004 [19].

[66] Source: Cost of Cyberliving http://www.foreignpolicy.com/articles/2004/07/01/cost_of_cyberliving

Data about IT usage

National Survey on Availability and Use of Information Technologies in Households[67]

Indicator	**2005**	**2006**	**2007**
Homes with computers (in% of the total of households)	18.60	20.60	22.10
Homes with Internet connection (in% of the total of households)	9.00	10.10	12.00
Homes with phone service (in% of the total of households)	64.10	66.60	73.70
Computer users (as percentage of the population equal and mayor to 6 years)	28.70	30.60	32.60
Internet users (as percentage of the population equal and mayor to 6 years)	17.80	20.00	22.20

Internet Usage and Population Growth[68]**:**

YEAR	Users	Population	% Pen.	Usage Source
2000	2,712,400	98,991,200	2.7 %	ITU
2004	14,901,687	102,797,200	14.3 %	AMIPCI
2005	17,100,000	103,872,328	16.3 %	AMIPCI
2006	20,200,000	105,149,952	19.2 %	AMIPCI
2008	27,400,000	109,955,400	24.9 %	eMarketer
2009	30,600,000	112,468,855	27.2 %	AMIPCI

[67] Source: INEGI
http://www.inegi.org.mx/est/contenidos/espanol/temas/Sociodem/cuadro_resumen_CyT.asp?s=est&c=126
[68] Source: Internet Statistics and Telecommunications Reports (Internet World Stats)
http://www.internetworldstats.com/am/mx.htm

MEXICAN INTERNET STATS[69]	Quantity (Total/percentage)	Place in World
Broadband access	937,000	[27th of 31]
Broadband Internet access > Broadband worldwide > Cable	0.70%	[23rd of 30]
Broadband Internet access > Broadband worldwide > DSL	2.10%	[30th of 30]
Broadband Internet access > Broadband worldwide > Total	2.80%	[28th of 29]
Broadband Internet access > Broadband worldwide > Total Subscribers	2,950,988	[12th of 30]
Broadband Internet access worldwide > Broadband subscribers in OECD countries > DSL	1.5	[29th of 30]
Broadband Internet access worldwide > Broadband subscribers in OECD countries > Other	0	[27th of 30]
Broadband Internet access worldwide > Broadband subscribers in OECD countries > Total	2.2	[28th of 30]
Broadband subscribers	2,304,520	[13th of 117]
Hosts	10,653,000	[8th of 228]
International Internet bandwidth > Mbps	11,238 Mbps	[30th of 167]
Internet Service Providers	51	[20th of 229]
ISP	51	[10th of 162]
Price basket for Internet > US$ per month	20.05 $/month	[104th of 180]
Secure Internet servers	1,038	[28th of 183]
Users	22,812,000	[12th of 190]

[69] Source: NationMaster.COM http://www.nationmaster.com/red/country/mx-mexico/int-internet&b_cite=1&b_define=1

Differents perspectives about IT in Mexico

Currently there are four ICT perspectives in the country[70]:

1. Academic and research sectors approach;
   Whose activities are predominantly aimed at the production of knowledge while promoting the formation of qualified human resources.

2. The business approach;
   For which, knowledge is a necessary resource to enhance the competitiveness and the creation of goods and services that can be exploited by marketing.

3. Technologists and engineering professionals approach;
   Who see the scientific and technological knowledge as a source of practical solutions for the provision of infrastructure, innovation and increased productivity.

4. Public administration approach;

Who farm their performance based on the existing regulatory framework and conducts performance evaluation system as a whole

Research ICT projects with the EU

"IT Link", started end of 2009, is financed by the Ministry of Economy, and strives to link the Mexican ICT industry with multinational companies in order to reach a bigger market coverage and to facilitate the management of clusters with the multinational companies. There are already 324 software companies registered in this initiative. The companies are tailor made software developers, IT service providers, software manufacturer and system integrators or consultants. 40% of the companies are dedicated to commercialization of software products, 73% count with an own product and 20% of the companies are in the process of acceleration.

Agenda Digital eMéxico 2010-2012: The objective of this initiative is to establish the basis for an articulated national policy in ICT under the leadership of the president of the republic fortifying the coordination mechanisms between the different public, private and social actors, intensifying the public and private investments to close the digital gap, improve and guaranty broad band connectivity all over the country, impulse the generation and fortification of capacities in the use of information and communication technologies and adaptation of content, information and knowledge to contribute human development and wellbeing. Generate mechanisms and models which allow the orientation of the adoption and use of ICT in areas and regions of mayor impact for social, economical and political development.

Three projects are related to this initiative:

[70] Taken from *Programa Especial de Ciencia y Tecnología* 2008-2012, CONACYT. Published at Diario Oficial de la Federación Sep 2008.

- National Campaign for Digital Inclusion "Vasconcelos 2.0" in order to create the technology appropriation in a massive way
- Platform eMéxico 2.0 to facilitate the access
- Networks with a social coverage in order to universalize the connectivity

Initiatives by individual companies or industrial sector: Microsoft Mexico launched in may 2010 a national initiative "Elevemos México" to impulse the development and competitiveness through the adoption of ICT. The intention is to include all stakeholders in society, in the moment mostly distributors and Microsoft product integrating companies are active. 4 groups of actions form this initiative: the development of local technology platforms and digital inclusion; programs for local innovation, education and economical development based on ICT industry; programs to enhance governmental efficiency, and programs for responsible leadership related to the industrial sector. A fund of $485 million USD in software and other technological tools for the next 3 years is assigned by Microsoft in support to this initiative, additionally courses for SME are offered[71].

Other initiatives come from the Federal Electric Commission and Telecom signing agreements with the government or academic associations to use the broad band infrastructure for academic or social purposes; others like Tecnológico de Monterrey in alliance with the Software Engineering Institute of the Carnegie Mellon University and with the support of some regional state governments and the federal program to incorporate quality models TSP (Team Software Process) and PSP(Personal Software Process) and certify the companies in these schemes.

REDTIC thematic network, founded in 2009 with financial support from CONACYT, supports the promotion and strengthening of research and technology development groups in Mexico from academy, research centers, industry or national laboratories. 6 specific strategic areas were defined in 2009: information relevant for decision taking, ICT for biomedicine, ICT and education, safety and transparency in information and services, intelligent environments for the problems of big cities, services based on the knowledge for citizens.

The Ministry for Foreign Affairs together with the National Council for Science and Technology created in 2009 the network of National Contact Points in different thematic areas, being ICT one of them. The objective of this network is to enhance the international cooperation in science and technology, map the national capacities and support researchers related to the proposal development and project management of international research projects.

International Cooperation Projects:

- FORESTA and Pro Ideal Plus: These two international cooperation projects started in January 2010 and are funded by the European Union. Their objective is to boost the research dimension of ICT cooperation and policy dialogue between EU and Latin American region.

First: This international cooperation project started in January 2010 too with funding from the

[71] Source: www.netmedia.info, 17th may 2010.

European Union. Its objective is to support the creation of Latin American Technological Platforms similar to the European model in the technological field of Future Internet (networks, content and services, ICT components and systems). During this first semester 2010 several of these initiatives and projects (RedTIC, PNCS-TIC, FORESTA, ProIdeal Plus and First) look for an exchange of opinions and try to streamline their action plans and strategies. An important contribution to the definition of a national ICT Policy in Research, Technology Development and Innovation in ICT is expected to be the result, joining forces and creating synergies, using the limited financial resources in a most efficient way for the benefit of Mexico.

ANNEX VI - Issues related to the ICT policies analysis in Uruguay

Evolution and current status of National ICT policies

Uruguay is undergoing a transformation in its National Innovation System, in 2005 was created the Ministerial Office of Innovation (GMI) that has changed the institutional design of the Innovation System, this is the reason why it is not yet possible to analyze the impact of these changes. On February 25, 2010 was approved the PENCTI (Science, Technology and Innovation National Strategic Plan) and is required some time to analyze their results. The PENCTI is part of the so-called "Uruguay Innovator" that is a proposed reform of public policies aimed at developing the capabilities of the National Innovation System in Uruguay.

The new institutional design began in April 2005 with the creation of the Ministerial Office of Innovation (GMI), composed by the Minister of Livestock, Agriculture and Fisheries (MGAP), the Minister of Industry, Energy and Mining (MIEM), the holder Office of Planning and Budget (OPP), the Minister of Economy and Finance (MEF) and the Ministry of Education and Culture (MEC), presiding. Subsequently, in December 2006 the parliament passed the law 18.084, which confers legal status to the GMI (Ministerial Office of Innovation), and gives to this institution a central role in setting policy and strategy guidelines in Science, Technology and Innovation. The law proceeds on the new design by establishing roles and responsibilities to two other relevant actors: the National Agency for Research and Innovation (ANII) operational arm of government policies and priorities of the Executive on the subject, and the National Innovation Council of Science and Technology (CONICYT), which was expanded and revitalized as a consultative and advisory body of the system.

An other important instrument, which is still in force, is the Digital Agenda 2008-2010 which objectives are the identification, prioritization and monitoring of programs and strategic projects to advance in the development of ICT; and, in prioritizing strategic plans and projects, organizing and disseminating in order to establish an overview and to promote continuity and projection based on monitoring and consistency mechanisms. The agency responsible for carrying out this agenda is AGESIC which depends on the Presidency of the Republic. The agency works with technical autonomy and communicates with the Executive Branch through the Office of Planning and Budget (OPP). From 2011, should be current a new Digital Agenda, which will seek to grow on the existing infrastructure created by the Digital Agenda 2008-2010.

The implementation of the PDT (Technology Development Program 2002 - 2008) is over, it lasted five years, its instruments and calls have no more validity and the PENCTI is now responsible for the development in Science, Technology and Innovation.

Current ICT policy

The current ICT policy in Uruguay is the PENCTI (Science, Technology and Innovation National Strategic Plan), designed by Operational Team of the Ministerial Office of Innovation (GMI) and conducted by the ANII (National Agency for Research and innovation). The GMI was created by in 2005 through a Presidential Decree as part of the commitments to implement Innovative Uruguay. The cabinet is composed of the Minister of Livestock, Agriculture and Fisheries (MGAP), the Minister of Industry, Energy and Mining (MIEM), the Minister of Economy and Finance (MEF), the Director of the Office of Planning and Budget (OPP) and the Ministry of Education and Culture (MEC) who is responsible for coordination. For the purposes of

implementing the actions in this matter, the GMI created on 22 April that year, an Operational Team (EO), composed of one delegate from each ministry, which aims to develop appropriate actions for the development of the first National Strategic Plan on Science, Technology and Innovation (PENCTI). PENCTI fundamental lineaments were defined on 6 September 2007. Finally, on February 25th of 2010, the President of the Republic approves the PENCTI.

The PENCTI is a national plan that has received funding from both the World Bank (Strengthening the Research and Innovation System, FOSNII) and a grant from the Korean Cooperation Fund implemented by the Inter-American Development Bank (ATN/KK-10271-UR).
The Inter-American Development Bank (BID), signed the Agreement of technical cooperation grants entitled "Preparing the National Strategic Plan for Science, Technology and Innovation (PENCTI).

The general objectives of the PENCTI are the following:

- Strengthen scientific and technological system and its relationship with productive and social reality.
- To enhance the competitiveness of productive sectors in the context of globalization.
- Development of skills and opportunities for social appropriation of knowledge and "inclusive" innovation.
- To educate and train the required human resources.
- Development of a system for forecasting, monitoring and technology assessment to support the achievement of other objectives, and evaluation of public policies and instruments of CTI (Science, Technology and Innovation).

Furthermore, the specific goals defined for the PENCTI plan are:

- To encourage and improve Human Resources Training.
- To promote scientific and technological development.
- To define and promote strategies for Internal Market.
- To define and promote strategies for Foreign Market.
- To promote the adoption and implementation of performance and quality standards patterns.

The main priority lines of this plan are training of human resources in research, management and production. Also is expected to enhance productivity and competitiveness based on innovation, quality improvement and management. In addition to this, another priority is to create a promotional framework for innovation consolidation. It is also aimed to strengthen scientific and technological infrastructure. Finally, it is expected to popularize Science and Technology.

In order to achieve all this goals, the following course of action has been designed:

- Establishment of a program for promoting computer education; and, technicians and professionals training.
- Strengthening and diversification of post graduation careers (Specialization, master and doctorate) in order to train human resources, targeting dynamic sectors or technological niches.

- Promotion of technical education (tertiary) for training human resources for quickly insertion in the industry.
- Promote a monitoring and technology capabilities observatory.
- Consolidation of high level research and innovation centers.
- Consolidate and extend research capabilities, through the funding of institutes and centers of excellence (Similar to millennium projects in Chile) and R&D projects of varying scope.
- Promote SSI product certification systems.
- Creation of SSI quality centres of excellence and implementation of technical support mechanisms and public awareness efforts.
- Creation of a fund in the area of ICT, with participation of Government, Business and Academia sectors in the definition of finance programs.
- Improving productivity and competitiveness of Technology enterprises.
- Adequacy of business models to target markets and generation of new models
- Internationalization.
- New business opportunities strengthening funding support to the ICT sector.
- Include a larger ICT component in production, with emphasis on export supply.
- Achieving greater coordination and synergy between the state and industrial sector.

In the PENCTI are highlighted the following items in relation to R&D (these items are not specific of ICT, but ICT is included):

- A core element of the PE.
- NCTI is the importance of invesment in R&D.
- According to the PENCTI, companies in Uruguay do not seem to relate in a systematic way with science and technology providers, this situation explains their low propensity to innovate. These ties become even more important when companies, as in Uruguay, do not have fields of R&D. The Innovation Activities Survey shows an approximation of the relevance of the interaction with the academic world in order to promote technical and organizational changes in companies. Between 2001 and 2003 only 63% of Uruguayan industrial firms have expressed in connection with any agent of the National System of Innovation (SNI), a proportion that in the case of companies considered innovative increases to 83%.
- One of the main action lines of the PENCTI is to support the establishment of research and technological development (R&TD) core business. Another important action is the development of postgraduate training programs in enterprises and the establishment of specific programs of R&D in partnership with the private sector in strategic areas.
- According to the Innovation Activities in Industry Survey done by DICyT during the period 2001-2003, only 36% industrial enterprises in Uruguay developed some innovative activity and only 14% performed R&D activities. Also, innovation in the country rarely has aimed at developing new products or processes for the global market, but it is often of incremental and adaptive nature, and often is the result of informal activities (between 2001 and 2003 only 2% of industrial enterprises introduced

innovations at international level, a 13% arrived to innovative results for the local market and 19% obtained new results only at the level of the enterprise).

- According to the PENCTI, the structure of expenditure in innovation activities reflects a strong preference of industrial enterprises for the acquisition of embedded technology (capital goods and hardware) as a way to improve performance. It is this type of item in which the Uruguayan industry employs the largest proportion of resources devoted to innovation activities (73% in 2003) being particularly scarce, however, the resources devoted to R&D (6 % of expenditure on innovation activities in that year).
- Another indicator of the low propensity of companies to develop R&D is the small participation of the private sector in total investment in these activities (less than 40% of total expenditure on R&D). At the same time, very few industrial companies have R&D professionals in the country (5,7% of industrial enterprises in 2003). In addition, R&D performed by companies in Uruguay is characterized for the high degree of informality: in 2003 just over 20% of the total personnel employed in R&D in industry served in units or departments created specifically for this purpose. R&D presents a huge grade of informality in Uruguay, this reflects the image that entrepreneurs have of R+D: it is a type of activity that in general has no registration and monitoring forms, which shows that it is not within the priorities of the enterprise or that they are conducted in a very informal and unsystematic way.
- The PENCTI poses, for 2020, raising the proportion of innovative enterprises to 45% and, particularly, to increase the rate of innovation among small units to more than 35%. It also aims to increase the proportion of industrial enterprises that develop R&D to over 20%.
- In relation to PENCTI action lines, the government intends to introduce tools that facilitate to incorporate innovations, a point to note is the introduction of tax instruments to promote innovation and, in particular, the development of R&D.
- According to the PENCTI, in general, the process of innovation is not the result of formalized R&D initiatives developed in specific laboratories. Rather, the development of R+D, is the cumulative result of informal learning which can be seen in the development of skills that allow to assimilate, adapt and even improve new technologies.
- The way of doing R&D has suffered huge changes during the last years. Some of these changes are due to different developments of scientific and technological fields and in the competitive environments faced by employers, much more complex than in the past and, in many cases, due to the entry of new players. There are many different forms of financing to stimulate research, development and innovation.
- Despite the items listed above include ICT, they are not specific of this area.

Previous ICT policy

The previous policy designed in Uruguay was the PDT (Technology Development Program 2002 - 2008). In this point we will also analyze the Uruguay Digital Agenda 2008-2010 that is still a current policy. The entity responsible for the PDT was the Ministry of Education and Culture (MCE) and the agency responsible for Digital Agenda is the Agency for the Development of Electronic Government Management and Knowledge and Information Society (AGESIC) for the Agenda.

The PDT aimed to develop an enabling environment for technological development, through innovation, from the educational, scientific, technological, legal and financial point of view. To create and enhance that environment is required of a National System of Innovation (SNI), a network of public and private institutions whose activities and actions initiate, import, modify and

disseminate new technologies. The main objectives of the PDT were:

- Access, Equity and Inclusion.
- Productive Development.
- Electronic government.
- Capacity Building and Knowledge.
- Institutionalizing and Regulatory Framework.

The Digital Agenda goals are the following:

- "Equity and Social Inclusion": generating more and better opportunities for the use and ownership of ICT for people, particularly groups and sectors disadvantaged and / or excluded.
- "Strengthening Democracy": to encourage transparency, providing the public sector the necessary tools, seeking the participation and coordination with academia, private sector and civil society.
- "State Transformation": achieve organizational and technological updating of the Public administration, streamlining and focusing its resources towards electronic services (E-services) oriented to citizens that allow an improvement the effectiveness and efficiency of its activities.
- "Development of Infrastructure": develop and strengthen the technological infrastructure at national level, and ensure the technical capacities and their sustainability.
- "Knowledge-Based Economic Development": encourage the use of ICT for productive development of the country, promoting the generation of quality products with added value in knowledge. Encourage the ICT industry and digital content production and use of ICT by Small and Medium Enterprises (SME).
- "Culture, Education and Knowledge Generation": encourage the educational use of ICT as promoters of cultural development in general, strengthening the capacities needed for the production of innovation and knowledge.
- "Regional Integration and Insertion": Consolidating the regional integration framework that promotes development, encouraging the renovation and/or creation of technological, policy and regulatory framework, necessary for the electronic exchange of information.

Instruments associated and managing organizations

The PDT (Technology Development Program) focused in three areas: support for innovation and improving competitiveness of enterprises, development and application of science and technology and National Innovation System Institutional Strengthening and was conducted by the Ministry of Education and Culture (MEC). The ADU 2008-2010 is much more inclusive and involves many more actors to achieve their goals. The institutions involved in ADU (Agenda Digital Uruguay) are: ANEP (National Administration of Public Education), LATU ((Technological Laboratory of Uruguay), ANTEL (Telecommunications National Administration), CUTI (Uruguayan Chamber of Information Technology), PACC (Program of Competitiveness for clusters and production chains), MEC (Ministry of Education and Culture), AGESIC (Agency for the Development of Electronic Government Management and Knowledge and Information Society), Correo, OPP

(Planning and Budget Office), RAU2 (Uruguay Academic Network), UDELAR (University of the Republic), Empretec, MEF (Ministry of Economy and Finance), ANII (National Agency for Research and innovation) and the parliament.

The ANII (National Agency for Research and innovation) is the agency responsible for executing the PENCTI (National Strategic Plan for Science, Technology and Innovation). This agency is a comprehensive institution, advised by the CONICYT (National Council for Innovation, Science and Technology). The ANII strategic guidelines dictated by the Ministerial Office of Innovation (GMI) are: Research and Development, Transfer of Technologic and Scientific Knowledge, Human resources Strengthening, Business Innovation, Articulation of the national innovation system and Entrepreneurship.

Regarding the current ICT Policy in Uruguay, it can be highlighted the PENCTI (Science, Technology and Innovation National Strategic Plan). The main entity responsible for executing the project is the ANNI (National Agency for Research and Innovation) that was created by the law 17.930 in December of 2005 and is the agency responsible for implementing the policies, organization and management plans, programs and instruments for scientific and technological development and deployment and strengthening of innovation capacities. The main objectives of the National Agency for Research and Innovation include the design, organization and administration of plans, programmes and instruments for scientific and technological development and deployment and strengthening of innovation capacities.

Following is the map of instruments and programmes of the ANNI (National Agency for Research and Innovation):

Research and Development Programmes:

- Professor Clemente Estable Fund for Scientific Research Technology
- María Viñas Fund
- R&D Beneficiaries Projects Fund

The objective of this fund is to support research through the funding of projects of excellence as a qualified as a priority for the country (Law 18172 of 30/08/2007, Article 305). The first call of Professor Clemente Estable Fund for Scientific Research Technology was in 2007. The last and second call of Professor Clemente Estable Fund was opened in 2009 and closed in early 2010.

The fund finances projects in the following three ways:

I. Projects of excellence with high expenditure and investment requirements.
II. Projects of excellence in disciplines with low expenditure and investment requirements.
III. Projects for young researchers, particularly post-graduate thesis.

Way	Amount per project (Uruguayan Peso)

I	$ 945.000 (60% must be for expenditure and invesment)
II	$ 525.000
III	$ 252.000

Total amount financed for Fund Professor Clemente Estable and María Viñas in 2009 Call:

Distribución de número y monto estimado de Proyectos a financiar de Modalidades I, II , y III, de los Fondos Clemente Estable y María Viñas

Modalidad	Número total de proyectos	Monto máximo por proyecto U$S	TOTAL U$S	FCE Nº	FMV Nº	FCE (U$S) TOTAL	FMV (U$S) TOTAL
Modalidad I	25	45.000	1.125.000	15	10	675.000	450.000
Modalidad II	35	25.000	875.000	22	13	550.000	325.000
Modalidad III	80	12.000	960.000	40	40	480.000	480.000
TOTAL	140	_____	2.960.000	77	63	1.705.000	1.255.000

FCE: Professor Clemente Estable Fund

FMV: María Viñas Fund

Transfer of Technologic and Scientific Knowledge Programmes:

- Energy Sector Fund
- Innovagro Fund
- Health Sector Fund

- Programme and Project Support for the Popularization of Science, Technology and Innovation,
- High social impact projects
- Innovative solutions for the inclusion of persons with disabilities
- Strengthening the Scientific-Technologic Services
- Scientific-Technological knowledge transference Beneficiaries projects.

Human resources Strengthening Programmes:

- National System of Researchers
- National Scholarship System
- Support Priority Tertiary Technical Education Programmes
- Support the national post-graduate programs
- Links with Scientists and Technologists Uruguayans living abroad and Strengthening Human Resources Beneficiaries Projects

Business Innovation Programmes:

- Innovation Projects of huge Coverage
- High Impact Innovation Projects
- Projects to Support Innovative Potential Prototypes
- Certification Projects and New markets for export
- Skilled human resources in the company
- Links with Uruguayans technologists living abroad
- CARPE (Creation, technical assistance and networks for professionalization business) program
- Supplier development program

Articulation of the national innovation system Programmes:

- Market and / or territorial programmes
- Energy sector fund
- Health sector fund
- Strengthening of scientific and technological services

Entrepreneurship:

- Sponsors Institutions
- Young Entrepreneurs
- Young Business Young entrepreneurship beneficiaries

It is also strategic objective of the ANII to promote the articulation and coordination between the

various actors involved in the creation and use of knowledge in order to improve synergies between them and maximize available resources.

The CONICYT (National Council for Innovation, Science and Technology) is composed of representatives of various organizations related to science, technology and innovation. Its aim is to tend towards finding ways of cooperation between them and advise the executive and the legislature. This organism has and advisory and consultative function towards the Ministerial Office of Innovation and is encharged of monitoring ANII's programmes and, specifically, the PENCTI (Science, Technology and Innovation National Strategic Plan).

The GMI (Ministerial Office of Innovation) is composed by the Minister of Education and Culture, the Minister of Economy and Finance, the Minister of Industry, Energy and Mines, the Minister of Livestock, Agriculture and Fisheries and the Director Office of Planning and Budget. Its main objective is the coordination and articulation of government actions related to the activities of Innovation, Science and Technology for development. In relation to the PENCTI, the GMI was responsible of preparing the plan. And, nowadays, is encharged of coordintating policy and strategy and of evaluating and tracking the plan.

Another current plan, running since 2006, is the "Basic Informatics Educative Connectivity for Online Learning", better known as "Plan Ceibal" that is a socio-educational project developed jointly by the Ministry of Education and Culture (MEC), the Technological Laboratory of Uruguay (LATU), the National Telecommunications Administration (ANTEL) and the National Public Education Administration (ANEP). The Executive has commissioned LATU technical and operational implementation of the Plan Ceibal.

Regarding Agenda Digital Uruguay 2008-2010 (this instrument is still running) is AGESIC (Agency for the Development of Electronic Government Management and Knowledge and Information Society). This agenda includes twenty-five specific goals and targets. These goals are related to targets with specific responsibles for the execution, so they can be considered instruments for developing ICT in Uruguay (we will analize this programme as instrument 1).

The goals and targets can be subdivided in five areas: access, equity and inclusion; productive development; e-government; building capacity and knowledge; and, institutionalization and regulatory framework. Following are explained the goals, the targets and the institutions responsaibles of achiving them:

Access, Equity and Inclusion:

Goal 1: to provide notebook PCs to all learners and teachers of public education, in order to facilitate access to Internet, and as a tool to improve education and encourage social equity. Target: Giving, via the CEIBAL Plan, portable personal computers to all students and teachers of Primary Education Council throughout the country, and train all teachers in the educational use of portable personal computers by 2010. The responsible institutions are ANEP and LATU.

Goal 2: to increase significantly the Internet connectivity services of the Education Centers. Target: Connect all schools by 2008 urban and all rural schools by 2009 from Educational Connectivity Program - PCE. The responsible institutions are ANEP and ANTEL.

Goal 3: to promote access and appropriation of ICT by the population, increasing the number of centres of access to information society, based on projects involving public – private sectors. Target: Install 15 CASI (Center for access to Information Society) and 15 CIS (Centers for

Information Society) per year until 2009. The responsible institution is ANTEL.

Productive development:

Goal 4: to improve productivity, competitiveness and international integration of ICT companies, based on the partnership and the creation of new business models and other initiatives. Target: Implementing the Strategic Software Plan whose activities are aimed at improving productivity and competitiveness of technology companies, at tripling exports during the next three years and at increasing at least to 10 the number of companies with a turnover of over USD 15 million annually for 2010. The responsible are CUTI and PACC.

Goal 5: to promote the development of small and medium enterprises to link the distribution of cultural content to the use of new digital networks such as Internet, mobile phone or digital TV. Target: Making the first call and awarding the Prize: Entrepreneurial culture and new technologies in 2008 and incubate up to five companies. The responsible are MEC and LATU.

Goal 6: to develop digital content and other educational resources related to programs force training aimed at people of all ages, from preschoolers to adults, and persons with disabilities. Target: available for 2008 of an updated version of the Educational Portal of the MEC with online educational resources, publications, interviews, theses and research, forums and online courses.Integrating the Educational Portal of the MEC to the Latin American Network of Educational Portals (RELPE). The responsible institution is the MEC.

E-government:

Goal 7: to build a physical network of high-speed communications, connecting central offices Executive Units of Public Administration. Target: implement the Uruguayan state inter-administrative Network (RED-UY), in all central government agencies in late 2009. The responsible institutions are AGESIC and ANTEL.

Goal 8: to extend the use of digital signatures to all public, private, academic and other sectors of society. Target: Have by 2010 a National Root Certification Institution, and the ability to provide digital certificates to all State officials required for their activities. The responsible institutions are AGESIC and Correo.

Goal 9: to facilitate the interoperability of procedures and services between Public Administration units, through the implementation of the Platform for Electronic Government. Target: install up to 2010 the Electronic Government Platform at least 50 State units, and developing and implementing in it, security services, certification and authentication, among other activities. The responsible institution is AGESIC.

Goal 10: to develop and improve the Portal of the State, emerging as the main digital gateway to public administration and its services, as well as an instrument of transparency and citizen participation. Target: establish by 2009 a new version of the Portal of the State, compatible with the Electronic Government Platform. The responsible institution is AGESIC.

Goal 11: provide policy, institutional and technical instruments that enable the interoperability and widespread the use of electronic records across government Public. Responsible: AGESIC.

Goal 12: promote access to decentralized State services, installing Attention Centres for Citizen (CAC) for formalities and services. Target: install electronic record systems in at least 30 executing units, and provide mechanisms for exchange of electronic record systems and tools for monitoring the records for central government by 2010. The responsible agencies are AGESIC and OPP.

Goal 13: to promote the knowledge society at a local level based on the model of Digital Communities or Cities, promoting the use of portals for departmental governments that provide municipal information and services and that allow citizen participation.

Goal 14: promote best practices in electronic government within public institutions. Target: having in the first half of 2009 a Electronic Government Institutional Maturity Model and running it in at least 70 executing units of the Central Administration for 2010. Have a set of Technical Standards and Guidelines for its implementation consistent with the model at the end of 2009. The responsible insititution is AGESIC.

Building Capacity and Knowledge:

Goal 15: to contribute to social integration and civic education through the creation of educational and cultural centres that act as meeting, entertainment, exchange and access to cultural and educational content, looking at cultural diversity and gender equity. Target: install and equip 35 MEC centers per year up to 2010. The insititution responsible is the MEC.

Goal 16: continue the policy to provide connection to enable regional and international research collaboration and education projects through advanced networks, promoting their extension and deepening its use. Target: providing connectivity to all universities and research centres in the country and create a unique database of researchers by 2010. The responsible institutions are: Rau2 and UDELAR.

Goal 17: to promote social inclusion of sectors have difficulty entering the labour market disseminating knowledge about the technological tools that allow teleworking and facilitating the use of ICT to generate employment. Target: perform 40 training activities (introducting courses to telework). The responsible institution is Empretec.

Goal 18: to facilitate the access of the national system of innovation in scientific publications in digital format of most significant specialist publishers, as well as databases global information on patents. Target: create a web portal for the national innovation system for December 2008, and generate international agreements that provide access to scientific and technological specialist publishers through other regional portals. The responsible institution is the ANII.

Goal 19: creation of new areas of excellence in innovative fields, integrating Science and Information Technology and Communication with other disciplines, and seeking future insertion of the graduates at the national level. Target: creating a post-degree career "Diploma en Bioinformatica" running in the second half of 2008. The responsible institution is UDELAR.

Goal 20: Increase the number of graduates in the area of ICT in higher education system. Target: designing and implementing the career of Information Technologist with 500 students by 2010. The responsible institutions are ANEP and UDELAR.

Institutionalizing and regulatory Framework:

Goal 21: updating the regulatory framework on Electronic Government and Information Society. Target: having approved and regulated by 2010:
• General Law of Privacy / Personal Data Protection
• Law on Access to Public Information
• Persons and Document Authentication Law
• Law on Electronic Signature Regulation
• General Law on Trade and Electronic Shopping

The responsible institutions are the AGESIC and the Parliament.

Goal 22: strengthening the institutional framework on Electronic Government and Information and knowledge Society in regulatory issues. Target: have the following operational units by 2010:
• Protection of Personal Data Unit
• Unit Access to Public Information Unit
• Center of Response to Computer Incidents (CERT-UY)

The responsible institution is AGESIC.

Goal 23: strengthening of institutional framework at the operational level of the ministries. Target: creation of Quality and Change Management Units in 8 Ministries for 2009. The responsible institutions are AGESIC, OPP and ministries.

Goal 24: to promote and strengthen the tools and mechanisms for State procurement. Target: creating a new Procurement Regulatory Unit and the Version 2 of the State Purchases System for 2009. The responsible institutions are OPP, MEF and AGESIC.

Goal 25: to define a mechanism for monitoring and evaluation of the objectives recommended in this Agenda. Target: implement a Project Office within the orbit of the AGESIC with the responsibility of defining the tracking mechanisms. The responsible institution is AGESIC.

Finally, regarding previous ICT policies, the PDT (Technology Development Program), the insttitution responsible of the programme was the Ministry of Education and Culture (MCE):

The Technology Development Program is structured around three subprograms containing several instruments:

The subprogram I, "support for innovation and improving competitiveness of enterprises":

- Direct support to individual companies.
- Project support business associations.
- Participation of experts in business.
- Promotion of Technology Transfer Centres, Business Incubators and Technology base Technology Councils.

The subprogram II, "development and application of science and technology":

- Joint supply and demand of technological knowledge in opportunity areas.
- Promotion of basic research.
- Training in opportunity areas.
- Exchange of researchers.
- Strengthening of scientific and technological services.

The subprogram III, " National Innovation System Institutional Strengthening":

- Strengthening of the design area and policy formulation.
- Strengthening Science, Technology and Innovation Information Systems.
- Strengthening of Supreme National Innovation System.
- Strengthening International Cooperation.

The budget assigned to this instrument (instrument 1), is of USD 26,67 millons.

Main stakeholders of the ICT field

- **ICT associations**

The CUTI (Uruguayan Chamber of Information Technology) has had a really important place in the development of ICT in Uruguay. It was founded in 1989 and is a center of reference and active partner in IT-related institutions, such as incubators, academic-industrial centers, universities, technology parks, guilds and associations. CUTI integrates a vast network of organizations and local institutions related to IT, which is key factor for dynamic and articulation.

The network “Uruguay, Information Society” (USI) aims to reduce the "digital divide", trying to make all citizens have an opportunity in the knowledge society. The USI program was approved by the ANTEL Board in March 2002. The USI was originally called "Mercury Community."

- **Companies of the ICT sector**

There are about 350 software development, consulting, services and Internet companies, plus nearly 400 sellers of hardware and software and about 1.600 one person businesses or independent professionals, who operate primarily in the consulting and services segment. The ICT activity is knowledge-intensive and therefore intensive in qualified human resources. The expansion experienced in the production and sale of products and services, has been accompanied by a strong growth in employment. Different ICT industry segments, including the State, employ over 8,000 workers.

Table 1 reproduces the corporate structure of the software and IT services, for 2004, which identified three subsectors:

1. Software development companies
2. Consulting and IT services companies
3. Internet and data transmission companies

ESTRATOS	SEGMENTOS					
FACTURACIÓN (MILLONES DE USD)	DESARROLLO DE SOFTWARE	CONSULTORÍA Y SERVICIOS INFORMÁTICOS	INTERNET Y DATOS	TOTAL	TOTAL SIN UNIP.	% ACUM
Más de 10	1	3	1	5	5	2%
De 5 a 10	1	3	0	4	4	3%
De 1 a 5	10	9	2	21	21	10%
De 0.5 a 1	10	12	4	26	26	18%
Menos de 0,5	117	61	69	247	247	100%
Unipersonales	0	1600	0	1600	0	
Total	139	1688	76	1903	303	
S/UP	46%	29%	25%		100%	

Table 6- SSI corporate structure – Source: CUTI Survey 2004

Uruguayan software industry and IT services consists mostly of small businesses. Considering the number of employees, most of the 350 companies in the sector are SMEs that operate with few staff, highly qualified and billing / person generally high. Figure 2 shows the structure of employment in the private sector.

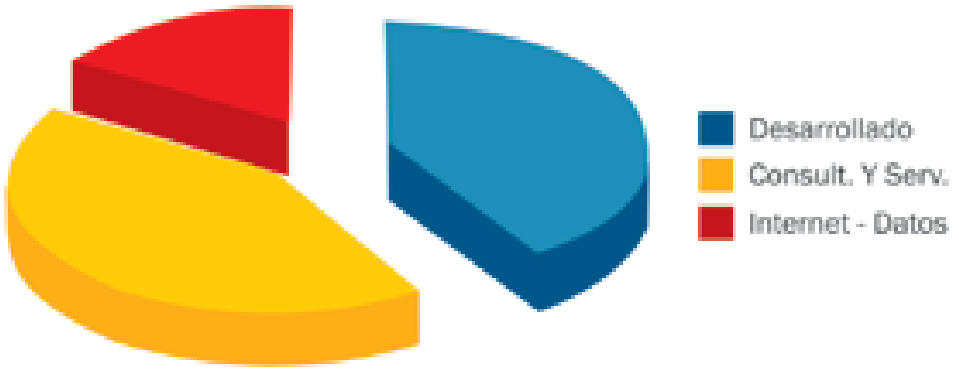


Fig. 18 - Employment structure in the Software and IT services market – Source: Final Report PENCTI 2008

Private domestic companies:

ARTech is the leading company in software development tools based on automatic management of knowledge. Its product, GeneXus27, has been exported to over thirty markets around the world; the company has offices in USA, Mexico and Brazil, and a wide network of distributors

and business partners. Other company that can be highlighted is Ideasoft, that has an own technology platform that includes Business Intelligence technologies, called IdeaSoft O3. This company, although is not within the SSI largest companies, is developing a product whose characteristics allow Artech a core position as innovator in the local market.
Another important company regarding its size and international presence is GROUP Quanam. Quanam is a professional services firm specialized in information technology, which has offices in 9 countries (Mexico, United States and seven countries of South America).

Public companies:

Two state companies are service providers in the ICT market. One is UTE (Electric Transmissions and Plants National Administration), which through its consulting unit, Conex, involved in consulting and services segment, operates both in the external market as well as internally (in this case, with a strong presence in the demand for other public bodies). The other state-owned company in the TIC market is ANTEL, the leading operator in the area of Internet access and data transmission, who through its business unit Antel Data, set up two companies that operate in private law:
- ITC (Intelligence in Telecommunications), carries out technical advice and assistance in the telecommunications, IT and business management areas, for domestic and foreign customers as well as ANTEL.
- HG, created to take over the management of the ambitious project of universal access to Internet and lower communications costs.

International companies:

In the segment of development, the presence of international companies is low; the main company in this market is Trintech, an Irish company that entered the market by acquiring a local firm. In the consulting and services segment is important the presence of TCS Tata Group, who settled its development center for Latin America in Uruguay in 2002. Other companies that stand out in this segment are BULL (a french capital company), established in Uruguay for many years, the Chilean company PROBE, IBM and MICROSOFT from the United States and SOLUZIONA from Spain.

- Funding agencies:

The following institutions provide financial assistance to productive projects. They are grouped according to the service they provide: Venture Capital, Capital to start the company (Seed Capital), and Co-financing.

- Venture capital: Prosperitas: it provides venture capital. The UIVC1 fund focuses on technology industries, services and agribusiness
- Seed capital:

Fondo Emprender: Comprehensive Support for Dynamic Entrepreneurship - Support for young enterprises with high growth potential in the following stages: the initial investment and enterprise development.

Fondo Zonamerica: provides advice, training, technical assistance, projects and business plans, finding financing to productive enterprises and micro businesses near Zonamerica.

Kolping Uruguay: develops a program to support young entrepreneurs (between 18 and 30 years) for the creation of microenterprises. Provides training, technical and financial assistance.

- Co-financing:

FDI (Domestic Development Fund): promotes regional or local development of the different departments of the country.

FONADEP (Provident National Fund): finances the accomplishment of programs and investment projects studies considered as priority for economic and social development. PIEP (Productive Specialization Internalization Program): supports associative ventures in the biotechnology, software and electronics fields through co-investment with grant funds.

PMAP (National Microfinance and Productive Joint Program): intended for groups of entrepreneurs. Is channeled through the Ministries and civil society institutions.

ANII (National Agency for Research and Innovation) was created by law 17.930 in December 19, 2005 and is the agency responsible for implementing the policies, organization and management plans, programs and instruments for scientific and technological development and deployment and strengthening of innovation capacities.

AGESIC (Agency for the Development of Electronic Government Management and Knowledge and Information Society) is an agency under the Presidency of the Republic. The agency has technical autonomy and communicates with the Executive Branch through the Office of Planning and Budget (OPP). It aims to ensure improved services to citizens, using the possibilities offered by Information Technology and Communications (ICT).

- Higher education institutions:

As regards the training of specialists in ICT, the current public offering is relatively undiversified. At the technical medium level is the Bachelor in Information Technology issued by the UTU (Labour University of Uruguay). At tertiary level, is the career in Computer Technologist recently created jointly by UTU (Labour University of Uruguay) and UdelaR (University of the Republic), and a short career, Technician in Networks and Telecommunications. Both, at technical and tertiary levels, the quotas are extremely low regarding the demand. Regarding public universities, graduate courses related with ICT are Computer Engineering and Electrical Engineering, and postgraduate courses include Masters and PhD in Computer Science and Electrical Engineering, Master of Computer Engineering, and two Specialization Diplomas, all taught in Engineering Faculty of UdelaR (University of the Republic). The private offering has an important role in the system and includes from technical courses of different types and profile dictated by a variety of institutions, through technical high schools, to university degree (Degree in Systems, Degree in Computer Systems, Computer Engineering, Telecommunications Engineering, Electronic Engineering, Telematic Engineering) and postgraduate in ORT University, Catholic University, University of Montevideo and South Autonomous University.

- Research organizations:

Research capacities are concentrated almost entirely in the UdelaR (University of the Republic), although research groups in some private universities are being developed, such as in ORT University. The main research center is the Computing Institute (INCO), part of the Engineering Faculty of the University of the Republic. The INCO has been adding to its traditional areas of research - strong theoretical content - more applied lines, which has generated a growing number

of joint R & D projects with public and private organizations.

Another organization that deserves special attention is the Software Testing Center (CES), a consortium formed by the Ricaldoni Foundation of the University of the Republic, the Uruguayan Chamber of Information Technology. The CES provides services in three key areas: software testing (testing), software test laboratory tests on various platforms and software technology observatory. In the laboratories associated program is highlighted the software NET Solution Center, inaugurated by ZONAMERICA, Microsfot Uruguay and ARTech, with support from Hewlett Packard.

Another organization of interest is the Academic Industrial Center of Information Technology Information (CAITI), whose main objective is the promotion of partnership between software companies and academic institutions. The CAITI was created from the initiative of universities with CUTI.

LATU (Technological Laboratory of Uruguay) is an organization founded in 1965 as a collaborative effort between the official and private sectors. Its mission is to promote sustainable development of the country and international integration, through innovation and valuable solutions transfer.

ORT University is the largest private University of Uruguay, with more than 11.000 students in five faculties and institutes. In 2009 was created the Innovation and Entrepreneurship Center (CIE) of the university. The CIE aims to encourage innovation and entrepreneurialism, promote initiatives and strengthen links between entrepreneurs, academic units, companies and support organizations. Provides students and graduates the opportunity to think about innovations and turning them into high potential businesses, contributing to the development of new enterprises that generate employment.

- Entities participating in R&D projects:

Cooperation LATU (Technological Laboratory of Uruguay) – BID (Inter-American Development Bank): The plan "Basic Informatics Educative Connectivity for Online Learning", better known as "Plan Ceibal" is a socio-educational project developed jointly by the Ministry of Education and Culture (MEC), the Technological Laboratory of Uruguay (LATU), the National Telecommunications Administration (ANTEL) and the National Public Education Administration (ANEP). The Executive has commissioned LATU technical and operational implementation of the Plan Ceibal. The Inter-American Development Bank (BID) approved in late 2009, a loan of USD 6 million to support the consolidation at the primary level and expand the scope to secondary level education. The Software Testing Center (CES) is an institution that provides services to evaluate the quality of products. Also anticipates technological changes, provides information on the latest technologies and builds a lung of innovation in the IT area, participating in technology development. The CES is a consortium conformed by Julio Ricaldoni Foundation, Engineering Faculty, University of the Republic and CUTI (Uruguayan Chamber of Information Technology). It is sponsored by the Economic Union in the framework of the Technology Development Project in Key Sectors of the Uruguayan Economy.

Experts contacted

Alvaro Lamé – President of CUTI (Uruguayan Chamber of Information Technology)

Miguel Brechner – President of LATU (Technological Laboratory of Uruguay)

Jorge Silveira –General Manager of LATU (Technological Laboratory of Uruguay)

Roni Liberman - CEO of Memory Computation

Full list of the main stakeholders of the ICT field

ICT associations	**CUTI (Uruguayan Chamber of Information Technology)**	**www.cuti.org.uy/**
	LATU (Technological Laboratory of Uruguay)	**www.latu.org.uy/**
	OBSERVATIC (ICT Observatory)	**www.observatic.edu.uy/**
	USI (Uruguay Sociedad de la información)	**www.usi.org.uy/**

Computer Services and Software	Telemática	www.telematica.com.uy
	CAyT Uruguay	www.catuy.com
	Cooperativa de Informática	http://www.coodi.com.uy
	MGNN – Soluciones Tecnológicas	www.mgnn.com
	Tata Consultancy Services	www.tcs.com/
	Infrastructure Technology Services	www.its.com.uy/
	GonzalesSystem	
	Delcand Solutions	www.delcand.net
	InMind IT Solutions	www.inmind.com.uy
	Infocorp	www.infocorp.com.uy
	Improvemit	www.improvemit.com

	Guf SRL	www.gufcs.com
	RedPOS	www.redpos.com.uy
	MontevideoSoft	www.montevideosoft.com
	UruIT IT Global Services	www.uruit.com
	Edutech	
	ST Consultores	www.st.com.uy
	Sofis Solutions	
	Asap	www.asapuruguay.com
	Quanam	www.quanam.com
	Takeoff Media	www.takeoffmedia.com
	San Diego SoftWorks	www.sandiego.com.uy
	Guerra Creativa	www.guerra-creativa.com
	Make IT Work	
	Itcon Uruguay	www.itcon.com.uy
	Statum	www.statum.biz
	SUAT	www.suat.com.uy
	TKF	www.tksoft.com
	Tools Tecnología Informática	
	Top Systems	www.topsystemscorp.com
	Tilsor	www.tilsor.com.uy
	Thot	www.thot.com.uy
	Touchit Online	www.touchitonline.com
	Todo Soft Uruguay	www.todosoft.com.uy

	Tu pedido Web	www.tupedidoweb.com
	Datamatic	www.Datamatic.com.uy
	Inforpyme	www.inforpyme.biz
	Etriek	www.etriek.com.uy
	LicenciasOriginales	www.licenciasoriginales.com
	Geocom Uruguay	www.geocom.com.uy
	UTE (Electric Transmissions and Plants National Administration)	www.ute.com.uy/
	Sonda	www.sonda.cl/
	Crovat	http://crovat.com
	Gda-It	http://www.gdait.com.uy
	Tecnolink S.A. Hexacta	http://www.inconcertCC.com http://www.hexacta.com
	IBM	www.ibm.com/
	Quartz Sistemas	http://www.quartz.com.uy
	S&D	http://www.syd.com.uy
	Go On Software	http://www.go-on-software.com
	Insis Ltda.	http://www.insis.com.uy
	d2B Network	http://www.d2bnetwork.com
	Nextive Solutions	http://www.nextive.com
	Itcomspace	http://www.itcomspace.com
	Portal del Bosque SA	http://wiprojects.net
	Intersys Ltda.	http://www.intersys.com.uy
	Nucleo Emprendimientos	http://www.nucleoe.com
	Grupo Codeset Universal	http://www.grupocodeset.com

	Plusvalia Labs	http://www.plusvalialabs.com
	Moove-IT SRL	http://www.moove-it.com
	Grupo Veria Uruguay	http://www.verial.com.uy
	Presentia Corp.	http://www.presentia.com.uy
	X-Sistemas	http://www.x-sistemas.com
	Ingenieros Consultores Asociados	http://www.ica.com.uy
	Memory Computación	www.memory.com.uy/
	Interzoic	http://www.interzoic.com
	3Cinteractive	http://www.3cinteractive.com
	AyP soft	http://www.ayp.com.uy
	Winking Armadillo	http://www.winkingarmadillo.com/
	4Tic	http://2bytes.com
	Datalogic Software	http://www.datalogic.com.uy
	Matchmind	http://matchmind.es
	I2ES | ideas to e.solutions	http://www.i2es.com
	Fibase SRL	www.fibase.com.uy
	7Eighth	http://www.7eighth.com
	Replayful	http://www.replayful.com
	Estudio Abierto	http://www.estudioabierto.com.uy
	Q-media	http://www.qmedia.com.uy
	R&P Sistemas	http://www.rpsistemas.com
	TFK Central de software	http://tfksoft.com
	Paytrue Solutions	http://www.paytrue.com
	U-Soft	http://www.u-soft.com.uy

	Solintelligent	http://www.solintelligent.com
	Magenta Innova	http://www.magentainnova.com
	Technologiesweb S.A	http://www.technologiesweb.com
	S&A -Sniadover & Asociados-	http://www.sya.com.uy
	2 Innovate	www.2innovateit.com
	Abstracta	www.abstracta.com.uy
	3DIP	www.3dip.net
	Accendo	www.accendo-it.com
	A+D Studio	www.aydstudio.com
	Acruxsoft	www.acruxsoft.com.uy
	Active	www.active.com.uy
	Adagio Consultores	www.adagio.com.uy
	Agemap Software	www.agemap.com
	Advansys	www.advansys.com.uy
	Ahlera	www.ahlera.com
	Advice	www.advice.com.uy
	Aiko	www.aiko.com.uy
	Agathon	www.agathon.com.uy
	Akros	www.akros.com.uy
	Aktio	www.eaktio.com
	Anectis Uruguay	www.anectis.com
	Altasur	www.altasur.com.uy
	Análisis de Sistemas	www.anasist.com.uy
	Aparaful Software	www.apraful.com.uy

	Análoga	www.analoga.com.uy
	Aquavisum	www.aquavisum.com
	Arkanosoft	www.arkanosoft.com
	Ascom Networks	www.netascom.com
	Arnaldo Castro	www.arnaldocastro.com.uy
	Artech Consultores	www.artech.com.uy
	AT	www.at.com.uy
	AT&G Informática	www.atg.com.uy
	Concepto	www.concepto.com.uy
	CPG Soft	www.cpgsoft.com
	Consist	www.consist.com.uy
	Corporación Combex	www.combex.com.uy
	Crea Labs	www.crea.com.uy
	CPA Ferrere	www.cpa.com.uy
	Before Soluciones Interactivas	www.b4before.com
	Bull Uruguay	www.bull.com.uy
	CSI Ingenieros	www.csi.com.uy
	Celular Soft	www.celularsoft.com
	Código del Sur	www.codigodelsur.com
	CentroMac Digital	www.centromac.net
	Circular	www.circular.com.uy
	Compuservice	www.cs.com.uy
	Ideasoft	www.ideasoft.biz/wiki/display/O3SOL/Home
	ITG	www.itg.com.uy

	ITS	www.its.com.uy
	K&S Information Technology	www.ksasociados.com
	Kayla Soluciones Informáticas	www.kalya.com.uy
	YAYG	www.jayg.net
	Kizanaro	www.kizanaro.com
	Unisys	www.unisys.com
	Urudata	www.urudata.com
	UruTI	www.uruit.com
	Urusys	www.urusys.com.uy
	Conatel	www.conatel.com.uy
	Know-How	www.knowhow.com.uy
	KPMG	www.kpmg.com.uy
	Logicalis	www.la.logicalis.com
	KYPRO Soluciones Informáticas	www.kypro.com.uy
	Logiscat	www.logicsat.com
	Magic Software	www.magicsoftware.com.uy
	Lups	www.lups.com.uy
	Magix	www.magix.com.uy
	Lynkos	www.lynkos.com
	Magma Tools	www.magmatools.com
	Manentia Software	www.manentiasoftware.com
	Security Advisor	www.sadvisor.com
	Lowend	www.lowend-uy.com

	Clip Connections	www.interclip.com
	CD Soft	www.cdsoft.com.uy
	Datalogic	www.datalogic.com.uy
	Deloitte	www.deloitte.com.uy
	Devsys	www.devsys.com.uy
	Dynatech	www.dynatech.com.uy
	BCN Informática	http://www.bcn.com.uy
	DVelop	www.dvelop.com.uy
	Easymail	www.easymail.net.uy
	Edantech	www.edantech.com
	Dynamo	www.dynamo.com.uy
	Invenzis	www.invenzis.com
	ISA	www.isaltda.com.uy
	ITCon	www.itcon.com.uy

Telecom Services	Atento Uruguay	http://www.atento.es/
	Adecco	www.adecco.com.uy/
	Cricom Telecomunicaciones	
	Inteligencia en Telecomunicaciones	www.itc.com.uy
	Isbel Telecomunicaciones	www.isbel.com.uy
	ANTEL	www.antel.com.uy/
	ANTELDATA	www.anteldata.com.uy/
	ANCEL	www.ancel.com.uy/

	RILOTECH	
	Telecom Personal	www.telecom.com.uy/
	Movistar	www.movistar.com.uy/
	Avanza	
	Uniotel	www.uniotel.com
	Claro	www.claro.com.uy/
	Movigroup	
	Imusa	
	Multiline	http://www.multiline.com.uy
	Agro Comunicaciones	
	Net People	
	Irem	
	Rossina Uria Sosa	
	Total Quality Services SRL	
	Huawei Technologies Investment Co., LTD	http://www.huawei.com
	Cibersons	
	Nikter S.A.	
	Servicenet	
	Call - MI	http://www.call-mi.com.uy
	Microsistemas	
	Vex	http://www.vexcorp.com
	Sagitel Telecom	http://www.sagitel.net
	Tcr	

	Arcape Task Force	http://www.arcape.es
	Creacion S.A.	http://www.creacion.com.uy
	Verifone	www.verifone.com
	Vertex Ray	www.vertexray.com
	Technology and Desing	
	Verum Development	www.verumdevelopment.com
	Wais (Contawin)	www.contawin.net
	X-Sistemas	www.x-sistemas.com
	Xionna	www.xionna.com
	Zureo – Mega	www.zureo.com
	Zen Sistemas	www.zen.com.uy
	Zona Libre	www.zonalibre.com.uy
	UY Group	www.uygroup.com.uy
	UY Software	www.uysoftware.com.uy

IT equipment and IT components	ICG Más (+)	
	Duodyn SRL	
	OneTree	
	Informática & Tecnología	http://www.it.uy.tc
	HP – Hewlett Packard	www.hp.com/

Funding agencies	ANII (National Agency for Research and Innovation)	www.anii.org.uy/

	AGESIC (Agency for the Development of Electronic Government Management and Knowledge and Information Society)	www.agesic.gub.uy/
	LATU (Technological Laboratory of Uruguay)	www.latu.org.uy/
	FDI - Fondo de Desarrollo del Interior	www.diprode.opp.gub.uy/fdi/estaticas/quees.htm
	FONADEP	www.opp.gub.uy/fondo_preinversion.php
	PIEP - Proyecto de Internacionalización de la Especialización Productiva (FOCEM - MIEM)	www.piep.org.uy/
	PMAP (Programa Nacional de Microfinanzas y Articulación Productiva)	www.diprode.opp.gub.uy/pmap
	Prosperitas	www.prosperitascp.com
	Fondo Emprender	www.fondoemprender.com.uy
	Fundación Zonamerica	www.zonamerica.org/quehacemos.htm
	Grameen Uruguay	
	Kolping Uruguay	www.kolping.org.uy

Higher education institutions	Universidad de la República (UDELAR)	www.universidad.edu.uy/
	Universidad ORT Uruguay	www.ort.edu.uy/
	UTU (Universidad del Trabajo de Uruguay)	www.utu.edu.uy/
	UCUDAL (Universidad Católica del Uruguay Dámaso Antonio Larrañaga)	www.ucu.edu.uy/

	Taller de Informática Instituto	www.tallerdeinformatica.edu.uy/
	Instituto Universitario Autónomo del Sur	www.universitario.edu.uy
	Universidad de Montevideo	www.um.edu.uy/

Research Organizations	INIA (National Agricultural Research Institute)	www.inia.org.uy/
	INCO (Instituto de Computación)	www.fing.edu.uy/inco/
	INAC (National Meat Institute)	www.inac.gub.uy/
	INASE (National Seeds Institute)	www.inase.org.uy/
	IEE (Biological Research Institute Clemente Estable)	www.iibce.edu.uy/
	ICI (Research and Science Institute)	www.ici.edu.uy/
	IAU (Uruguayan Antartic Institute)	www.iau.gub.uy/
	Institute Uruguay XXI	www.uruguayxxi.gub.uy/
	CSIC (Sectoral Comission for Scientific Research)	www.csic.edu.uy/
	CINVE (Economic Research Center)	www.cinve.org.uy/
	Research and Promotion Center Franciscano del Uruguay	www.cipfe.org/

	CIE (Innovation and Entrepreneurship Center)	www.ort.edu.uy/cie
	CAITI (Academic Industrial Center of Information Technology Information)	www.caiti.org.uy

Entities participating in R&D projects		
Entities participating in international R&D projects	Universidad de la República (UDELAR) LATU (Technological Laboratory of Uruguay) Instituto Universitario del Sur Universidad ORT Uruguay	www.universidad.edu.uy/ www.latu.org.uy/ www.universitario.edu.uy www.ort.edu.uy/
Entities participating in national/regional R&D projects, that don't participate in international projects	LATU (Technological Laboratory of Uruguay) – BID (Inter-American Development Bank) CES (Software Testing Center)	www.latu.org.uy/ www.ces.com.uy/

ANNEX VII – Issues related to the ICT policies analysis in Costa Rica

Institutional structure

The main public institutions regarding R&D in ICT are the Presidential Council on Competitiveness and Innovation, the Ministry of National Planning and Economic Policy (MIDEPLAN), the Ministry of Science and Technology (MICIT), the National Council for Scientific and Technological Research (CONICIT) and the Ministry of Environment, Energy and Telecommunications (MINAET).

The Presidential Council on Competitiveness and Innovation focuses its strategies on the improvement of infrastructure, the simplification of procedures and the promotion of investments. Priority actions are intended to work with human capital and innovation, the use of trade through existing treaties, the attraction of foreign investment, infrastructure development and to conclude in success of the opening of the telecommunications sector.

The Ministry of National Planning and Economic Policy (MIDEPLAN) is the advisory and technical support of the Presidency of the Republic of Costa Rica. It is the responsible for formulating, coordinating, monitoring and evaluating strategies and priorities of the Government to support the decision of the President of the Republic and the executive branch in general.

The Ministry of Science and Technology (MICIT) was established in 1986 and its mission is to promote, encourage and stimulate the creation of appropriate conditions for research, innovation, knowledge and technological development of the country and to support economic growth and better quality of life in Costa Rica.

The National Council for Scientific and Technological Research (CONICIT) was established in 1972 as an autonomous institution responsible for channeling and managing funds to the research field. The CONICIT manages internal resources and loans aimed at strengthening local capacities in management of science and technology. This is the main institution regarding the support of R&D activities.

The Ministry of Environment, Energy and Telecommunications (MINAET) aims to contribute to improve the quality of life of the inhabitants of Costa Rica by promoting the management, conservation and sustainable development of environmental and natural resources of the country by ensuring the necessary and full harmony between the activities of national development and respect for nature and the legal consolidation of citizenship rights in this matter. To this end, the MINAET stewardship in terms of environment, energy and telecommunications, coordinates the participation of other public and private entities in the generation and implementation of policies, strategies and actions aimed at achieving the national and international objectives, and encourages broad participation and responsible for the different sectors of civil society.

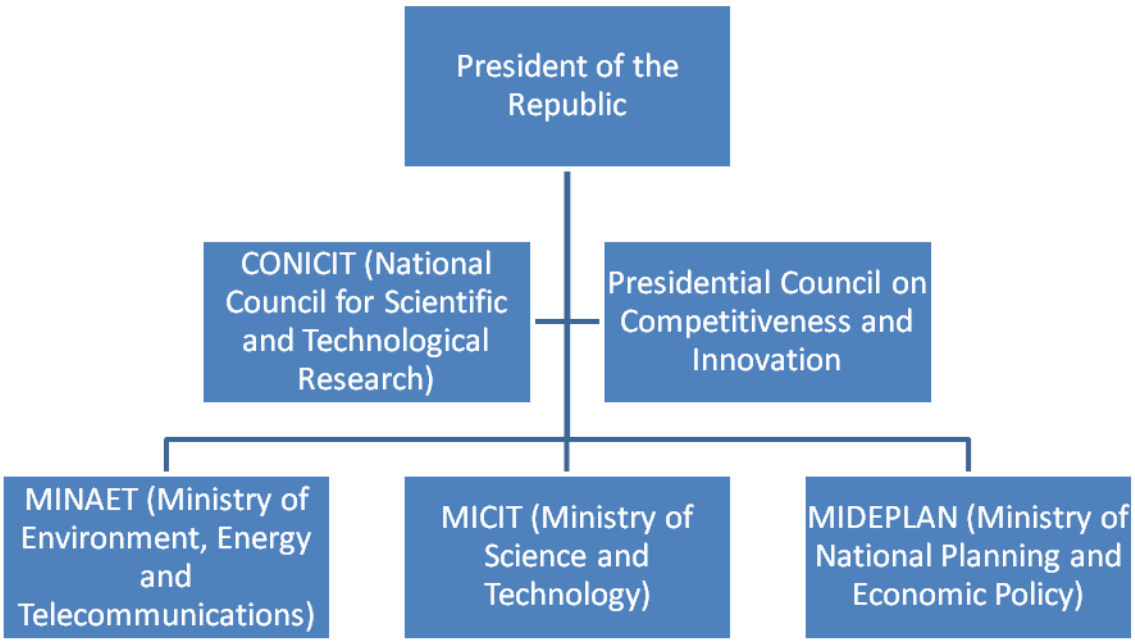


Fig. 19 - Structure and relations of governmental organizations with competences in ICT in Costa Rica

Evolution and current status of National ICT policies

The most important National ICT policies are the National Plan of Telecommunications Development, the XXI Century Strategy and The Digital Government Action Plan 2008-2010. The previous policies were the Development National Plan 2006-2010 and the National Plan for Information Technology (2004).

The National Plan of Telecommunications Development, is more restricted compared with the previous policy, the National Development Plan 2006-2010, that included many more areas in addition to ICT (social axis; productive axis; environmental, energetic and telecommunication axis; institutional reform axis and foreign axis).

The National Plan of Telecommunications Development is based on Law N°8642 "General Telecommunications law". The plan goes from 2009 up to 2014 and its policy goals are to:

- Guarantee an efficient use of the radio electric capacity for ICT development.
- Cover the whole country area
- Ensure a full interoperability and interconnectivity
- Implement modern and intelligent technologies for a better networking.

The ministry coordinating the policy is the MINAE (Ministry of Environment, Energy and Telecommunications) and the priority lines of the plan are the following:

1. Telecommunications Axis
2. Economic Axis
3. Environmental Axis

4. Social Axis

The previous ICT policy was the Development National Plan 2006-2010 and the policy goals of the plan were the followings:

1. Fighting corruption in all spheres of public sector action.
2. Reducing poverty and inequality.
3. Increasing economic growth and employment.
4. Improving quality and expanding coverage of educational systems.
5. Stop the growing rates of crime, drug trafficking and drug abuse and reverse the growing sense of insecurity on the part of all citizens.
6. Strengthening public institutions and manage the State's priorities.
7. Recover and expand the nation's transportation infrastructure.
8. Ennoble foreign policy and restore the role of Costa Rica in the world.

The ministry coordinating the plan was the MIDEPLAN (Ministry of National Planning and Economic Policy) and the priority lines were:

1. Social Policy Axis
2. Productive Policy Axis
3. Environmental, Energetic and Telecommunications Policy Axis
4. Institutional Reform Axis
5. Foreign Policy Axis

In 2004 was launched the National Plan for Information Technology. The design process of the proposal was made by the Information Technology Chamber of Costa Rica (CAMTIC), the International Economic Policy Centre of the National University (CINPE), Centre for Technology and Informatics Management (CEGESTI) and experts from the University of Oslo in Norway. The strategic objectives of the plan are:

6. To foster the right environment for creation and development of sustainable and competitive businesses.
7. To promote and stimulate innovation, IP generation and creation of high value-added business.
8. Integrate and effectively represent the segments that make up the ICT sector.
9. To develop mechanisms for linking business, political, financial and knowledge sectors.
10. To position and support the sector to become a successful global supplier of products an d services.

Also, the Ministry of Science and Technology, supported by the Innovation Directorate, seeks to consolidate the System of Science, Technology and Innovation (SCTI), with the aim of achieving more coordination among academia, government and private sector.

There is also a strategy for long-term development, the. XXI Century Strategy 2004-2050, that seeks to promote the integral development of Costa Rica, through a platform founded on: education, science and technology and innovation. The initiative is funded by the Foundation for Cooperation Costa Rica-United States (CR-USA). In 2006, the National Centre for High Technology (CENAT) of the National Council of Rectors (CONARE) agreed to host the implementation.

This XXI Century Strategy describes the guidelines towards a solid structure for the development of R&D. Some of the main actions mentioned are:

- Strengthen the connection between different R&D subsectors
- An urgent revision of the legal framework for R&D activities
- Solve the lack of funding programmes and policies for R&D
- Define priorities for the different R&D areas
- Boost the long term development of research centers
- Increase the bound between the researchers and the productive sector
- Help research centers to fulfill the society and productive sector's needs focusing on universities
- Promote activities and seminars to connect the demand and supply of scientific knowledge
- Create and launch several mechanisms to stimulate R&D by public funds and polices

The Digital Government Action Plan 2008-2010, which is carried out by the Digital Government Secretariat, sets out the strategy of development of projects undertaken in various institutions with the support of the Digital Government Secretariat. The strategic objectives of the Action Plan are:

- Achieve a significant level of ICT culture and governance in the government sector
- Improve and ensure key government services and processes
- Promote interoperability of processes and procedures of the institutions
- Achieve a significant level of connectivity of the State
- Significantly improve access and technology literacy of citizens
- Establish mechanisms and procedures for the management of the Secretariat that positively impact the state institutions and officials.

Instruments associated and managing organizations

The National Plan of Telecommunications Development has a national scope and addresses the following ICT subsectors: Telecom and multimedia equipment, Telecom services and Computer

services and software subsectors. The total budget is between U$S 220 and U$S 260. The budget assigned to the selected sub-sectors is the following:

- Telecom & multimedia equipment: U$S 80 millions
- Telecom services: U$S 120 millions
- Computer services and software: U$S 50 millions

The main instruments of research policy are FONATEL and SUTEL:

- FONATEL: the National Telecommunications Fund was established on June 4, 2008, by the General Telecommunications law Nº 8642, to ensure universal access and service in the area of telecommunications, after the opening market process of this market. This fund was established with the contribution of an annual percentage of the revenues of the telecommunications sector and will be managed as a trust.
- SUTEL: the Superintendence of Telecommunications is the entity responsible for regulating telecommunications services.

SUTEL, FONATEL (SUTEL dependent) and the Telecommunications Rectory are the instruments and the funding source for meeting the following objectives:

1. Telecommunications Axis

a. Networks and Systems

1. Ensure the efficient use of radio spectrum and modern, intelligent, reliable and flexible technologies.
2. Ensure Coverage.
3. Ensure interoperability and full interconnection.
4. Ensuring modern and smart technologies to guarantee the convergence of networks and services.

b. Telecommunications Security

1. Ensure the physical and logical security of telecommunications networks.
2. Ensure the continuity of the service provision.

2. Economic Axis

a. Competition and consumer protection

1. Ensure a competitive environment in telecommunications.
2. Ensure satisfaction of the needs and expectations of consumers.

b. Productivity

1. Ensuring to the business sector access to applications and services based on ICT.
2. Ensure that the telecommunications system allows the creation of new productive activities central to ICT.
3. Ensure the incorporation of ICT in the public service.

c. Logistic

1. To ensure the use of ICT in the field of public and private management

2. Confirming the development of electronic commerce to expand business opportunities of companies

d. Innovation

1. Increase investment in scientific research, technological innovation and ICT production.

3. Environmental Axis

a. Environmental protection

1. Ensure compliance and continuous updating of environmental legislation in the development of telecommunications.

2. Ensuring the rational use of natural resources and the adoption of low-impact technologies on the environment.

3. Ensure the potential of ICT to improve environmental, including prevention, mitigation and adaptation of natural resources.

b. Electronic and technological waste management

1. To ensure an integrated management of waste materials from telecommunications activities

c. Green Shopping

1. Ensure the incorporation of environmental criteria in procurement of the telecommunications sector.

4. Social Axis

a. Universal access, universal service and solidarity

1. Ensure universal access.

2. Ensure Telecommunications services to country's inhabitants who are in conditions of economic social and geographical vulnerability.

b. Education and training

1. Ensure and incorporate the use of ICT in the education system
2. Ensure the digital literacy of the members of the country
3. Ensure the generation of value-added applications with the use of ICT to help develop creativity and skills of the student population

c. Health

1. To ensure the provision of health services of the country's population through the intensive application of ICT in services provided by the State in this field.

The budget assigned to FONATEL (National Telecommunications Fund) is between U$S 132 and 156 millions while the budget assigned to SUTEL (Superintendence of Telecommunications) is between U$S 55 and 65 millions. Finally, the budget assigned to the Telecommunications Rectory is between U$S 19 and 23 millions.

The previous ICT policy plan was the National Development Plan 2006-2010, this plan had a national scope and the total budget is U$S 1.560.878.779. The Science and Technology budget between 2007 and 2010 was U$S 19.401.394.

The main instruments of research policy are:

- CONICIT (National Council for Scientific and Technological Research): this council has the following tools to encourage the development of Science and Technology in Costa Rica:
  The Incentive Fund under the Ministry of Science and Technology (which is managed by the CONICIT processes annually applications for postgraduate studies), research projects, attendance at scientific meetings, short courses, intensive training and internships, as well as programs for researchers reintegration.

  Furthermore, through Law 8.262 the ProPymes Fund was established to support companies in incorporating science and technology and innovate in their production methods. These competitive funds are administered by the CONICIT; requests are channeled to address technological needs and services such as metrology, accreditation, certification, standardization, total quality and information.

  With own resources, the CONICIT operates the Risk Research Fund (FORINVES), a non-reimbursable financing mechanism for researchers.

- The Ministry of Science and Technology (MICIT) was established in 1986 and its mission is to promote, encourage and stimulate the creation of appropriate conditions for research, innovation, knowledge and technological development of the country and to support economic growth and better quality of life in Costa Rica.

The MICIT and the CONICIT are responsible for achieving the following action Lines on Science and Technology in the National Development Plan framework:

1. The MICIT will design and implement the National System of Science and Technology for Innovation, where will be considered the XXI Century Strategy, as well as CONARE (National Council of Rectors) contributions, business associations and other members of the sector.
2. Design and implement a strategic plan to promote increased investment in Research, Development and Innovation (R + D + I) to become 1% of GDP in 2010, for which stimulate the participation of the CONARE and XXI Century Strategy.
3. Promotion and development of Science and Technology, at a regional level, through the Regional Councils of Science and Technology (CORECIT).
4. Strengthening the platform of digital services through the Smart Community Centers (CECIS) throughout the country.
5. Program to strengthen human resources in Science, Technology and Innovation. And expanding the scope of the Inter Institutional Mobile Classroom.
6. Program to support and promote innovative initiatives, technology transfer and knowledge generation, with special emphasis on strengthening linkages between SME and Research Units.
7. Consolidation of the Costa Rican Accreditation Entity (ECA) as an organism recognized at national and international level and as unique responsible of issuing accreditations in the country.

8. Plan to promote science and technology among vulnerable populations, carrying out activities and projects to the priority participation of people with disabilities, elderly and indigenous.
9. Development and improvement of the provision of Telecommunications services.

Regarding international cooperation, the CENIBiot is a cooperative project of science and technology sponsored by the European Union aimed at increasing the competitiveness of agro-industrial sector through the development and application of biotechnology.

It is projected for 60 months (the end date is December 2010), in the first two years will be built and equipped the center. It counts with a total budget of 14,9 million Euros of which 10,9 million are contributed by the European Union and the remaining amount is for national counterpart..

Key ICT indicators in Costa Rica

It is important to remark that the weight of ICT in GDP has been growing significantly during the last ten years. Also, R&D expenditure has almost doubled between the years 2000 and 2009. These two indicators show the great importance given to science and technology and ICT during the last ten years.

Regarding the use of technology by the population, there has been a significant penetration and it is possible to see these through broadband and mobile subscriber's rates.

Full list of main stakeholders in the ICT field

ICT associations	CAMTIC (Chamber of Information Technology and Communication)	www.camtic.org/
	CENFOTEC (Information Technology Training Centre)	www.cenfotec.com/
	CIENTEC (Foundation for the National Center for Science and Technology)	www.cientec.or.cr/
	Free Software Community – University of Costa Rica	softwarelibre.ucr.ac.cr/
	Dialogia de Información y Comunicación	dialogia.org/
	FUNDATEC (Costa Rica Technolgy Fundation)	www.tec.cr/Fundatec

	Fundación Acceso	www.acceso.or.cr/
	Fundación CAATEC (High Technology Advisory Commission of Costa Rica)	www.caatec.org/
	Fundación CRUSA	www.crusa.cr/
	Fundación Galileo	www.galileo.or.cr/
	Fundación Omar Dengo	www.fod.ac.cr/
Computes services and Software	Abax Asesores	abaxasesores.com/
	Align Tech	www.aligntech.com/
	Altus Consulting	www.altus.co.cr
	Amazon	www.amazon.com/
	Aura Interactiva	www.aurainteractiva.com/
	Avionics	www.avionics.com/
	BT	www.bt.com/
	CE INTEC	www.ceintec.com/
	Clear Corp	www.clearcorp.com/
	Cooperativa Sula Batsu	www.sulabatsu.com/
	Coral Systems	www.coral-systems.com/
	Código Sur	www.codigosur.org/
	Continental AG	www.conti-online.com/
	Desca	www.desca.com
	DIMO Computación	www.dimocomputacion.com
	Gears Soft	www.gearsoftware.com/
	Greencore	greencore.co.cr/
	Gridshield	www.gridshield.net/
	Grupo Galileo	www.grupogalileo.com/

	Hermes	www.hermes-soft.com/
	Hospedia	www.hospedia.net
	IBM	www.ibm.com/
	Intel	www.intel.com/
	INTERDESA	www.interdesa.com/
	InterHAND Servicios	www.interhand.net/
	Profesionales S.A.	
	InterNexo - Tecnologias de Internet	www.internexo.com/ES/
	Interweb Computing Solutions S.A.	www.interwebcs.com/
	Microsoft	www.microsoft.com/
	MisNegocios.net	www.misnegocios.net/
	MyTechCR	www.mytechcr.net/
	Open Source Consulting	www.osc.co.cr/
	Oracle	www.oracle.com/
	Profesionales en Redes y Sistemas de Cómputo S.A.	www.pronetsys.co.cr/
	PYMESdotcom sdn (SAP Developer Network)	www.pymesdotcom.com/ www.sdn.sap.com/
	Solsoft de Costa Rica S.A.	solsoft.biz/
	Soluciones Informáticas ACR	acr-solucionesinformaticas.blogspot.com/
	Soluciones Integrales en Computación ZN	www.siczn.com/
	SukiaLogic	www.sukialogic.com/
	TecnoLinuxCR S.A.	
	Tecnoiversiones Centauro	www.tecnoinversiones.com/

Telecommunications	ADN Solutions	www.adnsolutions.net/
	Alfa Maik Delta	www.amdcr.com
	Alkaid Consulting	www.alkaidconsulting.com/
	Alpha Global Communication	alphaglobalcr.com
	Business Solution Consulting	www.bscsa.info
	Coasin	www.coasin.net
	Comunicación 3G	www.telme.sg/visualtelme
	Coretalk Costa Rica	www.coretalkgroup.com
	CRC Telecomunicaciones	www.crctel.com/
	CRM CSI Telecom	www-crm-csi.com
	CRllamadas	www.crllamadas.com
	Datatell	www.datatell.net
	Dexsa Costa Rica	www.dexsacr.com
	Dow Networks	www.downetworks.co.cr/
	Emtec	www.emteccr.com
	Entertainment Multimedia Systems	www.emscostarica.com
	Fruno	www.fruno.com/
	GPS Satelite	www.gpssatelite.com/
	GPS Semacc	www.gps.cr
	Grupo DICE Telecom	www.grupo-dice.com
	Grupo ICE	www.grupoice.com/
	Cablevisión de Costa Rica	www.cablevision.co.cr
	Globaltec Technologies	www.globalteccr.com
	Grupo Matel	www.cablesespeciales.com
	Huawei Technologies	www.huawei.com

	Idnet	www.idnet.cr
	Imago Comunicación Interactiva	www.imagoci.com/
	Ingeniería Nacional HG	www.hgcr.maximocr.com
	Ingytelcom	www.ingytelcom.com
	Intertel World	www.intertelworld.com
	ITS Infocom	its.co.cr
	Ntecsa	www.ntecsa.com
	Nutek	www.nutek.in
	Othos Telecomunicaciones	www.othos.co.cr
	Panduit	www.panduit.com
	P.B.X Costa Rica	www.pbx.co.cr
	Plataforma Globalges	www.globalgestion.net
	Telcos Telecom	telcostelecom.net/
	Radio Mensajes CR	www.radiomensajes.co.cr/
	Redes Inalámbricas de Costa Rica	www.Reicocr.com
	Reycom	www.reycomcr.com
	Sippytel	www.sippytel.com
	Sky de Costa Rica	www.sky.com.mx/centroamerica/
	Sistemas de Red	www.sistemasdered.com
	Soporte Técnico Global	www.stgsa.com
	Startek	www.startek.com
	Tecnova	www.TecnovaSoluciones.com
	Telcentris	www.telcentris.com
	Telecable	www.telecablecr.com/
	TenTSAL	www.grupotent.com

	Wizcomtec	www.wizcomtec.com
	Worldcom	www.worldcom.cr
IT Equipment	Grupo CESA	www.cesa.co.cr/
	HP	www.hp.com/
	Cotisa	www.e-cotisa.com
	Netway	www.netway-group.com
	RedesCR Avances Tecnológicos	www.redescr.com
	Servicom del Oeste	www.stgsa.com
	Sirtecom Centroamérica	sirtecom.cl
	Jimenez Belinchón Costa Rica	www.jbsa.es
IT Components	Alliance IP	www.allianceip.net
	Inversiones Zheng Wu Chang	mobishopcrc.com
	Astrolab	www.astrolab.com/
	Celulares Alex	www.celularesalex.com
	Multimix Metrotechnologies	www.merrimacind.com
Funding agencies	FONATEL - SUTEL	http://www.aresep.go.cr/cgi-bin/index.fwx
	CONICIT (National Council for Scientific and Technological Research)	www.conicit.go.cr/
	FUNDATEC (Costa Rica Technolgy Fundation)	www.tec.cr/Fundatec
Higher education institutions	Universidad Creativa	ucreativa.com/
	UNED (Universidad Estatal a Distancia)	www.uned.ac.cr/
	Universidad Nacional (UNA)	www.una.ac.cr/

	Universidad de Costa Rica (UCR)	www.ucr.ac.cr/
	Instituto Nacional de Aprendizaje (INA)	www.ina.ac.cr/
	Instituto de Capacitacion y Asesoria en Informática	www.icai.una.ac.cr/
	Instituto Tecnológico de Costa Rica (ITCR)	www.itcr.ac.cr/
	Universidad Técnica Nacional – Sede CIPET	www.cipet.ac.cr/
	Universidad para la Cooperación Internacional (UCI)	www.uci.ac.cr/
	INCAE Business School	www.incae.edu/
	ULACIT (Universidad Latinoamericana de Ciencia y Tecnología)	www.ulacit.ac.cr/
	Universidad de Iberoamérica	www.unibe.ac.cr/
	Universidad Hispanoamericana de Costa Rica	www.uhispanoamericana.ac.cr/
	Universidad de Ciencias Médicas (UCIMED)	www.ucimed.com/
	Instituto Politécnico Internacional	www.politecnico.cr/
	Universidad Americana	www.uam.ac.cr/
	Universidad Santa Paula	www.uspsantapaula.com/
	Universidad Autónoma de Centramérica (UACA)	www.uaca.ac.cr/
	Universidad Earth	www.earth.ac.cr/
	Universidad Internacional de las Americas (UIA)	www.uia.ac.cr/
	Universidad Fidélitas	www.ufidelitas.ac.cr/

	Universidad de Cártago Florencio de Castillo	www.uca.ac.cr/
	Universidad Católica	www.ucatolica.ac.cr/
	Universidad Metropolitana Castro Carazo	www.umca.net/
	Universidad del Diseño	www.unidis.ac.cr/
	Universidad Veritas	www.uveritas.ac.cr/
	Universidad Latina	www.ulatina.ac.cr/
	Universidad Tecnológica Costarricense	www.utc.co.cr/
	Universidad de las Ciencias y Arte de Costa Rica	www.udelascienciasyelarte.ac.cr/
	Universidad Magister	www.umagister.com/
	Universidad del Valle	www.udelvalle.com/
	Universidad Central	www.universidadcentral.com/
	Universidad Santa Lucía	www.usantalucia.com/
	Universidad Internacional San Isidro Libertador	www.uisil.com/
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SWOT analysis of national ICT policies

1. Strengths:	***2. Weaknesses:***	***3. Opportunities:***	***4. Threats:***
1.1. Strong Software and Computer Service sector. 1.2. Highly educated workforce. 1.3. Solid experience and great dynamism in terms of digital government, though still in a nascent state. 1.4. Economic and Social stability. 1.5. Strategic Location.	2.1. Some important factors for ICT development still need to be developed.	3.1. Growing potential for ICT services domestic firms. 3.2. Telecommunications infrastructure: ICE (Electricity Institute from Costa Rica) projects. 3.3. Strong advance regarding internet penetration: Expansion of national ICT market and consciousness of the sector.	4.1. Inequality in ICT access between regions and lack of strong entities participating in R&D activities

		3.4 Creation of a long term perspective: "XXI Century Strategy" 3.5 Increased government interest in education.	

1. Strengths

1.1. Strong Software and Computer Service sector**:**

ICT industry presents a very rich ecosystem with a strong presence of domestic industries, as well as major multinational corporations, which has consolidated a strong ICT industry, especially in the area of Software and Computer Services.

1.2. Highly educated workforce:

The Costa Rican labor force is highly educated in informatics due to the National Informatics Education Program of the Ministry of Education and the Omar Dengo Fundation (PRONIE MEP-FOD) has promoted the inclusion in Costa Rica since 1988. Also, the government has accorded high priority to investment in public education, including both the university system and technical and vocational training. The abolition of the army in 1949 freed resources that have been invested in free education and health services for the population.

1.3. Solid experience and great dynamism in terms of digital government, though still in a nascent state:

From the digital government point of view, there are solid and successful experiences of great dynamism; the technological, legal and institutional advance of the country is significant, and there are observed opportunities to undertake a process of citizen-centered development, with potential to achieve results of short-term impact. Many basis of this eGov project are part of a Digital Strategy called "Costa Rica green and smart" developed by software entities chamber, CAMTIC.

1.4. Economic and Social stability:

The economic, political and social stability of Costa Rica is a major advantage. As a result of this stability, Costa Rica has benefited from good access to global capital markets and an award for moderate "country risk".

Also, is current the National Development Telecommunications Plan 2009-2014, which provides as part of a Digital Solidarity Agenda, a set of actions aimed at bringing telecommunications services to all sectors, regardless of their socio-economic condition nor geographical location. This is an important advantage because it facilitates and encourages the use of ICT in society.

Finally, the Costa Rican government is increasing the specialized education focused in ICT that will help the improvement of R&D projects. Recently the government pushed the expenditures in

this area from 6% to 8% of the GDP.

1.5. Strategic Location:

Costa Rica has an excellent location because it is in centre of the Americas. Moreover, geographical proximity and greater cultural affinity with the United States, generates cost savings and a more peaceful environment in this market.

2. Weaknesses

2.1. Some important factors for ICT development still need to be developed. Factors that need more development:

- Variety of funding sources beyond credit.
- Capital market development.
- Taking full advantage of special public funds (Fodemipyme) due to access problems.
- Permanent statistics to track the performance of public institutions and enterprises.

3. Opportunities

3.1. Growing potential for ICT services domestic firms:

In the area of services, there is significant potential for growth for domestic firms, especially considering that this branch is a real differentiator over its competition. Costa Rica is leader in Central America. In 2007, 78% of software companies in the region of Central America and Dominican Republic were located in Costa Rica.

3.2. Telecommunications infrastructure: ICE projects

Regarding telecommunications infrastructure, there are in the ICE (Electricity Institute of Costa Rica) projects with a high degree of physical and financial progress, aimed at achieve greater use and extend the capabilities of the country's public telecommunications platform: Internet, fixed telephony and cellular, between others.

3.3. Strong advance regarding internet penetration. Expansion of national ICT market and consciousness of the sector:

Between 2008 and 2010 the total internet connections grew from 218.801 to 325.000 and 85.6% from the total use broadband technology (according to CISCO Barometer 2009). This represents an important increase of the demand of new services and contents by the Costa Rican population. In addition to this, a better environment for R&D activities is generated. This is still a intermediate situation and Costa Rica should boost this aspect in order to achieve the goal of a 7% penetration of internet services.

3.4 Costa Rica is creating a long term perspective which paves the way towards a stronger development path:

The "XXI Century Strategy" is an initiative that includes the main stakeholders from public,

academic and private sector in order to discuss and define the main objective for the country in the long term (2050). There are 5 main areas of interest defined:

1. Economic and Human performance
2. Institutional performance
3. Innovation performance
4. Education and Human resources performance
5. Information infrastructure performance

3.5 Increased government interest in education.

In May 2010, was approved the Act Amending Article 78 of the Constitution by allocating 8% of GDP on public education. The destination to public education increased from 6% to 8%.

4. Threats

4.1 Inequality in ICT access between regions and lack of strong entities participating in R&D activities:

There is inequality in ICT access between regions and lack of strong entities participating in R&D activities that makes the development process more fragile to economic turbulences.

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