



D4.3 Identification and Analysis of ICT research priorities

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1 EXECUTIVE SUMMARY

PRO-IDEAL PLUS dedicates WP4 to complement the project activities from a top-down level in the new PRO-IDEAL PLUS target countries (Mexico, Costa Rica, Colombia and Cuba), and additionally in Argentina, Brazil and Chile. The organization of Round Tables to identify ICT research priorities and put the basis of a Roadmap for ICT collaboration with the EU is closely related to the efforts in promoting the ICT programme and international cooperation carried out through ICT Days and ICT Fora.

Deliverable 4.3 reviews the ICT research policies in Latin America target countries, i.e. Argentina, Brazil, Chile, México, Colombia, Costa Rica and Cuba, their strengths and weaknesses, and the R&D priorities in view to future cooperation activities in the field of ICT.

Chapter 2 presents the objectives of Deliverable D4.3 and Round Tables methodology. The objectives of Deliverable 4.3 are to identify and analyse the ICT policies and research priorities in LA target countries, and to assess their alignment with the priorities of the EU for ICT R&D. Round Tables, Country Reports on the status of ICT policies and the PRO-IDEAL PLUS survey were used as a basis for the elaboration of the report.

The Round Tables methodology consists on the three main issues (tables) including the respective discussed questions and some indications, in order to assess:

- *Table 1:* Priority areas of interest for ICT R&D (based on the PI+ survey)
- *Table 2:* Talent management and training for ICT R&D
- *Table 3:* Infrastructure ICT R&D.

The organisation of the Round Tables comprised a sprightly agenda taking into account the selection of subjects, reference documentation, speakers and coordination. This agenda considers the facilities for all participants to attend the meeting and maximise their participation. The execution of the Round Tables followed the agenda composed of three parts:

- Part I: Introduction. Presentation of opportunities of the FP7-ICT Programme for research cooperation with Europe, national priorities in S&T and ICT and the results of the PRO-IDEAL PLUS survey on ICT R&D priorities.
- Part II: Discussion, the number of tables depending on the number of participants. All discussion groups work with the same questionnaire.
- Part III: Conclusion, presentation of findings summarized by the moderator of every table and a general discussion and conclusion.

Chapter 3 shows the current state of the S&T and ICT research policies, including the view of ICT researchers and stakeholders, and the potential for international cooperation in ICT. It presents an overall scenario for ICT priorities in LA target countries in order to set up a common understanding on ICT policies in view to future EU-LA cooperation. In this way, we review the national policies and strategies for ICT development, the ICT research initiatives and funding mechanisms, the public policies, the strategies at corporate or business associations level for ICT industry development, the legal framework and other public documents relevant to national ICT policies, the public and private institutional structure for the development of ICT and the ICT priorities for R&D in each country.

The understanding of the current ICT R&D activities is not only based in the analysis of the national policies on ICT, but also in the qualified opinions of national stakeholders who have supported the project and the cooperation in ICT R&D between LA and EU. Thus this chapter includes the Round Tables highlights as well as the most important ICT researchers and stakeholders in each LA target country.

The emerging potential for EU-LA cooperation in ICT was also strengthened during the Round Tables, which allows performing a SWOT analysis per country summarising the Strengths, Weaknesses, Opportunities and Threats for international cooperation in ICT.

Chapter 4 presents an analysis of the ICT research priorities areas, starting with the results of the PRO-IDEAL PLUS survey, as a quantitative basis to understand the view of stakeholders. These findings were used as the primary starting point for discussion during the Round Tables between key stakeholders per country. As a result, for each country it is presented a top five key priority areas, and a top ten for the whole countries.

Finally, chapter 5 presents the main conclusions and findings of D4.3, highlighting the emerging scenario for a new stage of ICT R&D cooperation between EU-LA.

2 INTRODUCTION

2.1 Objectives

The objectives of Deliverable 4.3 are to identify and analyse the ICT policies and research priorities in LA target countries, i.e. Argentina, Brazil, Chile, México, Colombia, Costa Rica and Cuba, and to assess their alignment with the priorities of the EU for ICT R&D. The report is a review of the current research priorities and main policy dialogue initiatives to strengthen international cooperation in ICT and thus to support Latin America national research agendas and strategies geared towards international R&D co-operation in the ICT field. Results from this Deliverable will serve as a basis for the Roadmap on ICT research collaboration that will be provided at the end of the project.

The identification and analysis of ICT research priorities and their long-term perspective and alignment with the EU research priorities is based on qualified opinions gathered by the Latin America partners through Round Tables with stakeholders and policy makers' held in Mexico, Colombia, Costa Rica and Cuba. Moreover, the report is also based in previous research and surveys conducted under the PRO-IDEAL and PRO-IDEAL PLUS projects, namely the Country Reports on the Status of ICT policy development in Argentina, Brazil and Chile and the survey performed in June 2010 on ICT research priorities in the countries partnering in the PRO-IDEAL projects.

2.2 Round Tables Methodology

Previous task for the organisation of the Round Tables was the identification and pre-selection of key players to be invited to participate in the respective countries, including public authorities, researchers, academic community and private industry. Overall, the preselected lists included 74 potential participants for Mexico, Colombia, Cuba and Costa Rica, based on their endorsement to ICT policy dialogue, contribution to ICT research, potential to foster LA-EU cooperation and industry leadership (See D.4.1- List of selected key players in ICT research policies by country - Mexico, Colombia, Cuba, Costa Rica). Also a tentative schedule of the Round Tables per target country was provided in D.4.2 - Schedule and organisation of Round Tables.

A common and flexible methodology and structure for the Round Tables was proposed by ITESM and agreed by the partners, in order to facilitate comparisons and extract common conclusions.

2.2.1 General considerations

Due to the importance of the national ICT R&D policies and the reduced time to gather key players of all sectors in the Round Tables (of 3 to 4 hours long), we proposed to use interactive methodologies already used in the project, such as the Knowledge Café methodology or the Safari methodology (See D3.2 Concept and methodology of Interactive Workshops), and based on the successful experience of the Safari workshops held in Mexico, Colombia and Cuba. Both methodologies can be adapted to different environments and needs from the target countries and partners.

Knowledge Café is a methodology allowing interaction and exchange of ideas among participants in a relatively short time, i.e. in 20 to 30 minutes, depending on the needs of each country. In the Round Tables using this methodology, participants envisaged a close analysis of three main issues, one per table. Each issue was tackled in rounds of interactive discussions based on three core questions. Participants sit in tables of 10 to 20 people with one person acting as moderator and other acting as a rapporteur per table. After each question round, the moderator remains to summarise and gather what was said at her or his table while the remaining persons move to other tables as ambassadors of knowledge.

The Safari principle differs from the Knowledge Café in the sense that issues are represented as stations or milestones where participants move to, and create an incremental picture of ideas and suggestions.

Following are the three main issues (tables) including the respective discussed questions and some indications:

Table 1: Priority areas of interest for ICT R&D (based on the PI+ survey)

- a) *What are the most important ICT R&D priority areas in your country? (select 3 and rank them in accordance to their importance)*
- b) *In which of these areas you see potential for cooperation in ICT R&D between your country and the European Union? (near, mid and long term, in relation with your country capacities).*
- c) *How could the existing international cooperation agreements assist to promote the development of these areas?*

In this section, it is required to show the participants the "Top 10 priorities" from the PRO-IDEAL PLUS survey, and based on this priorities, to choose the top three-five they consider their country has the required conditions to participate immediately in a joint collaboration with the European Union (in terms of talent and infrastructure).

Table 2: Talent management and training for ICT R&D

- a) *What are the most important actions to consolidate the activities of researchers and experts in technological development in ICT in your country?*
- b) *What actions of the government and business sector you consider important to improve management and training of human resources for R&D in ICT in your country?*
- c) *What actions would you recommend for a university-business synergy, in order to promote and strengthen technological innovation projects through the training of human resources? (at national level and at AL-UE level)*

For this table it is important to consider particular information, as the amount of researchers on ICT per country (Academy), as well as the human resources available in the business sector, or the number of companies engaged in technological development. This information allows the visualisation of the areas with the available human resources to respond to a specific call (LA-EU). This may suggest where and in what areas to invest in training of future R&D talent (in a medium and long term).

Table 3: *Infrastructure ICT R&D*

- a) *In your opinion, what are the priority areas in terms of ICT infrastructure for R&D in your country? (select 3 and rank them in accordance to their importance)*
- b) *What elements are required to enable the development of infrastructure for ICT R&D (in the political, public and private sectors)?*
- c) *What are the ICT R&D priority areas in terms of infrastructure that could foster a strong synergy with LA and the EU?*

This table helps to have a general idea of the computing infrastructure data (i.e. data centres) and telecommunications (i.e. bandwidth, links, etc.) that may be currently available for R&D. Again, this information helps to envision the immediate available infrastructure in the country and future investments areas in the medium and long term.

2.2.2 Organization

The organisation of the Round Tables comprises the following activities:

Draft the Agenda

- The development of the agendas (see Annex 1), according to the selection of subjects, reference documentation, speakers and coordination.

Invitations

- Elaboration of a list of at least 60 participants (including the list of key players reported in D4.1 for each country) to be invited to the Round Table.
- Send customized invitations (electronically and/or physically).
- Reception of confirmation of acceptance via phone call, email or personally.

Facility selection

- The selection of the place highly depends on the facilities for all participants to attend the meeting and consequently maximise their participation.
- According to the agenda, we offer enough time to share the experience of all actors without compromise other activities of key players.
- Preparation of material and documentation to be distributed among the participants.

2.2.3 Execution of the Round Tables

For the Round Tables, the selection of the methodology depends on the particular conditions in each partner country, so each local partner selected the best one for each country (Knowledge café or Safari).

For the selection of moderators, we consider important to choose people who have participated in the project ICT Days or Safari workshops, so they have previous knowledge of the PRO-IDEAL PLUS project and dynamics. There were previous conversations with them to emphasize the theme and the objective to be achieved with the development of the Round Table.

Identification and Analysis of ICT research priorities

The agenda is composed of three main parts:

Part I: Introduction

Registration

- Welcome.
- Presentation (European Cooperation and the Seventh Framework Programme of the European Union, National priorities in S&T and ICT).
- The results of the PRO-IDEAL PLUS survey on ICT Research and Development priorities.

Part II: discussion

This section could be composed in two ways:

- 1) To have three tables with a maximum of 9 persons, one with one question, and to role the participants to the following table every 30 minutes. Discussion finishes after 1:30 hours.
- 2) To have 4 or more tables with a maximum of nine participants per table. All discussion groups work with the same questionnaire and for each topic having 20 minutes of discussion. So the discussion table lasted a total of 60 minutes.

Participants at each table were previously selected in order to have diversity of views and positions, including representation of public, academic, and private sector members on each group.

Part III: Conclusion

- Completed the assigned work, each group had 5 minutes to present their findings, which were summarized by the moderator of every table.
- A general discussion and conclusion is presented in 20 minutes.

2.2.4 Particularities per country

Mexico

The first Round Table took place at the Mexican National Council for Science and Technology (Consejo Nacional de Ciencia y Tecnología, CONACYT), Av. Insurgentes Sur 1582, Col. Crédito Constructor Del. Benito Juárez C.P.: 03940, México, D.F. Mexico, on May 24th, 2011, from 13:45 to 18:00.

The Round Table in Mexico was organized by ITESM and the following persons and entities:

- Miguel Gonzalez Mendoza (Tecnológico de Monterrey)
- Hector Samano Rocha UEMEXCYT-2 CONACYT)
- Neil Hernández Gress (NCP ICT Mexico)
- Frank Rattmann (Tecnológico de Monterrey)

And with the collaboration of the following people:

- Stephany Zaleta Arguello (Tecnológico de Monterrey)
- Yolanda César (Tecnológico de Monterrey)
- Moira Claudia Karosuo Argüelles (UEMEXCYT-2 CONACYT)
- Avril Martínez García (UEMEXCYT-2 CONACYT)

The Round Table Mexico brings together 24 people (Government 9, Education 7, Enterprise 9) of entities like:

- Government: Comisión de Ciencia y Tecnología del Senado, Comisión Especial de Acceso Digital, Integración, Coordinación de la Sociedad de la Información eMexico, Economía Digital, eMexico, Consejo Nacional de ciencia y Tecnología (CONACYT), Consejo Estatal de Ciencia y Tecnología del Estado de Jalisco (COECYTJAL), Consejo Mexiquense de Ciencia y Tecnología (COMECYT), UEMEXCYT.
- Enterprises: Cluster Monterrey, Cluster para TIC del Estado de Queretaro (CC - proyecto FIRST), Cluster TI, Prosoftware, Ciudad de México, Asociación Mexicana de la Industria de Tecnologías de Información (AMITI), The Competitive Intelligence Unit , HP-México, Microsoft.
- Academia: Asociación Nacional de Instituciones de Educación en Informática (ANIEI), Red Mexicana de investigación y desarrollo en computación (REMIDEC), Foro Consultivo Científico y Tecnológico (FCCYTF), Asociación Nacional de Facultades y Escuelas de Ingeniería (ANFEI), Sociedad Mexicana de Inteligencia Artificial (SMIA), Red Temática de TIC (RedTIC), Corporación Universitaria para el Desarrollo de Internet (CUDI).

Particularities of the adopted methodology

According the schedule, the meeting began with the registry of the participants in the CONACYT building.

The national coordinator of the project Miguel González Mendoza PRO-IDEAL PLUS gave the welcome to the session. Héctor Sámano Director of the office UEMEXCYT-2 opened with a brief overview of the related activities to promote the cooperation in R&D Mexico-UE. Neil Hernández introduced the related activities of the NCP-ICT office and enlisted the main achievements of the first year of activities.

The adopted methodology for the Round Table was the Knowledge Café method, with 3 tables distributed as follows:

Table 1

- Moderator: Patricia Zuñiga Bello; Rapporteur: Ma. de Lourdes Martínez.
- Topic: Identify priority areas of interest in ICT R&D

Table 2

- Moderator: Neil Hernández Gress; Rapporteur: Israel Tabarez.
- Topic: Talent management and training for ICT R&D

Table 3

- Moderator: Jorge Ramírez Medina; Rapporteur: David González.
- Topic: Infrastructure for ICT R&D

The first activity was a brief description of the objectives and methodology of the Round Table, by Frank Rattmann, followed by a "speed dating" activity to break the ice among participants, and then work on the tables according to the Knowledge Café methodology. The event finished with a round of conclusions of each table and some personal comments of participants.

For the Mexico's first Round Table, the information issued in the first part, the discussion of issues in each table and the final discussion was very fruitful for

participants. All attendees emphasize the importance of the exchange of experiences towards a common effort with EU to improve the impact of ICT R&D activities in the Mexican society.

Colombia

The first Round Table in Colombia took place at the Four Points Sheraton Medellín. Cra. 43 C No. 6 Sur 100, Colombia, on June 24th, 2011, from 12:00 to 17:00.

The Round Table in Medellín was organized by UNAL and the ARTICA members:

- Jairo José Espinosa Oviedo (UNAL)
- Roberto Carlos Hincapie (UPB)
- Jorge Ivan López Jaramillo (IPS)
- José Edinson Aedo Cobo (UDEA)
- Juan Fernando Márquez (UNE)

And with the collaboration of the following people:

- Pablo Andres Deossa (UNAL)
- Julian Alberto Patiño (UNAL)

The Round Table hosted 19 people (Government 5, Education 7, Enterprise 7) of entities like:

- Government: ARTICA, EPM (Smart Grid Section), Tecno-parque SENA.
- Enterprise: UNE, Process Online, AVA, ACOPI, Nova tecnología.
- Academia: Cintel, IPS Universitaria, UPB, UNAL, UDEA.

Particularities of the adopted methodology

According to the schedule, the meeting began with the registry of the participants and lunch, and after that the Round Table begins.

The national coordinator of the PRO-IDEAL PLUS project Jairo Espinosa welcomes participants and then Ramiro Paniagua, Executive Director of ARTICA, gave a brief overview of the ARTICA Group. The methodology of the Round Table was the Safari method; the moderator was Jairo Espinosa and worked with 3 tables distributed as follows:

Table 1

- Moderator: Jose Aedo; Rapporteur: Roberto Hincapie.
- Topic: Identify priority areas of interest in ICT R&D

Table 2

- Moderator: Jorge Ivan López; Rapporteur: Pablo Deossa.
- Topic: Talent management and training for ICT R&D

Table 3

- Moderator: Juan Marquez; Rapporteur: Julian Patiño.
- Topic: Infrastructure for ICT R&D

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The first activity was a brief description of the objectives and methodology of the Round Table, then a "speed dating" activity to break the ice among participants, and then work on the tables according to the Safari methodology to finish with a round of conclusions of each table and personal description of the experience of each assistant.

The attendees' opinion about the activity and the methodology was very positive, they considered the experience successful and productive, and in general the participants are confident to provide solutions and implement proposals for the topics discussed at the Round Table.

Cuba

The first Round Table Cuba took place at SOFTEL facilities, Carretera San Antonio de los Baños Km 2 ½ UCI, Boyeros, Ciudad Habana, Cuba, on June 14th, 2011, from 09:00 to 12:00.

The Round Table in La Habana was organized by the partner SOFTEL, coordinated by Luis Guillermo Fernández.

The Round Table was attended by 30 people (Government 6, Education 11, Enterprise 13) of entities like:

- Government: MIC, AVANTE, MINSAP, FORDES, ONI (MIC).
- Enterprise: Citmatel, CEDAI, Softel, Radio Cuba, Copextel, Segurmática.
- Academia: CUJAE, Universidad de la Habana, UCI, Banco Nac. Cuba, Lacetel, Cuba Energía.

Particularities of the adopted methodology:

The Round Table Cuba was organised in order to give continuity to the Safari held during March 2011, through a Survey sent by email having the 3 areas with their respective questions. Participants were invited to come with these results in order to have an open discussion around these questions, while maintaining the interest to motivate their participation.

All participants received an invitation and agenda. The Round Table was focused on the discussion of the three common topics. Prior to the Round Table the participants had answered by e-mail a survey about ICT research priority areas and perspectives to collaborate with the EU priorities. The discussion of the results of this survey was the basis to start the Round Table.

Costa Rica

The first Round Table Costa Rica took place in the Hotel Barceló San José Palacio (Salón El Coral), San José Costa Rica, on June 15th, 2011, from 07:30 to 12:00.

The Round Table in San José was organized by the following entities:
Otto Rivera Valle Executive Director CAMTIC
Fervoy Paul, Vice-President CAMTIC

To the Round Table assist 36 people (Government 14, Education 9, Enterprise 13) of entities like:

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- Government: MICIT, Proinnova, Estado de la Nación, Unión Europea, Min. de Justicia, CONICIT, Banca p/ el desarrollo, PANI, Casa Presidencial,
- Enterprises: CONARE, CAMTIC, Codisa, Internexo, CSJ, Sulabatsú, Estrategía siglo XXI, Cenfotec, MTSS, Procomer, AED, Arias & Muñoz, CreceX, SUTEL, MEIC, Link Inversiones, TecApro, Arkkosoft, Identiga Karto, Análisis MBC, GBSYS, Grupo CMA, Electromatica, REMPRO, Fair Play Labs, Grupo Cesa, AVantica.
- Academia: UCR, UNA, TEC, FOD, Politécnico, INA, Academia Nacional de Ciencia.

Particularities of the adopted methodology:

For the first part of the Round Table, the following topics were covered:

- 1) European Cooperation and the Seventh Framework Programme of the European Union, José Luis Martínez Prada, Charge d'Affaires of the European Union.
- 2) Promotion Project of an ICT Dialogue between Europe and Latin America (PRO-IDEAL-PLUS), Otto Rivera Valle Executive Director CAMTIC.
- 3) The National Plan of Science and Technology and the Indicators of Science and Technology, Alejandro Cruz Molina, Minister of Science and Technology.
- 4) National Strategy and Intelligent Verde Costa Rica. Fervoy Paul, Vice-President CAMTIC.
- 5) The results of the survey PRO-IDEAL PLUS Research and Development in ICT, Otto Rivera Valle, Executive Director of CAMTIC.

The session consisted of five panel discussions, with a maximum of nine participants per table. As stated in the general methodology, participants at each table were previously selected in order to have diversity of views and positions.

The five discussion groups worked with the same questionnaire for discussion which concerned the three main topics:

- Priority areas of interest in ICT's R&D
- Talent Management and Training for ICT R&D
- Infrastructure for ICT R&D

For each topic, there was 20 minutes discussion. In this way, the entire discussion was 60 minutes long. Once the assigned work was completed, each groups had 5 minutes to present their findings, which were summarized by the moderator of the activity.

3 ICT R&D IN LATIN AMERICA

This section shows the current state of the activities related to Research and Development (R&D) in the area of ICT. It includes an overview of each target country regarding their ICT national policies, the view of national ICT researchers and stakeholders, and a SWOT analysis on the potential for international cooperation.

3.1 ICT National policies

3.1.1 Mexico

In the Mexico's Great Vision Project 2030 (*Proyecto de Gran Visión México 2030*)¹, and in the National Development Plan 2007-2012 (*Plan Nacional de Desarrollo 2007 - 2012*)², the government establishes, as axis number 2, the development of a competitive economy as a source of employment. Specifically, it is established the promotion of productivity and competitiveness of the Mexican economy to achieve sustained economic growth and accelerate creation of employment, through five strategies:

- 1) To integrate a national competitiveness agenda, involving all three branches of federal government, the three levels of government and the private sector;
- 2) To design sectorial agendas for the competitiveness of economic sectors with high added value and technological content, as well as to restructure the traditional sectors and to generate better-paying jobs;
- 3) Lower costs to open and operate business through regulatory improvement;
- 4) To promote conditions of economic and free competition and to combat monopolies; and
- 5) To enhance and facilitate the processes of scientific research, technology adoption and innovation to increase the productivity of the national economy.

Additionally, it ensures the access and expansion of the coverage of infrastructure, transport and communications services, both nationally and regionally³. So, to increase access to telecommunication services to a growing number of Mexicans, the government establishes the following strategies:

- 1) To increase competition between dealers in order to increase coverage of services in the country and to contribute rates that may allow access for more service users;
- 2) To promote the adherence of actors at all levels of government and society for the design and development of strategies to simplify the use of information and communication technologies;
- 3) To promote the development connectivity through technological infrastructure, in order to achieve a penetration of over 60% of the population by strengthening the use of technology services everywhere, developing relevant contents of high impact to the population;
- 4) To modernize the regulatory framework, allowing the growth of telecommunications, the use and development of new technologies and security on the use of information, services and electronic transactions;

¹ <http://www.vision2030.gob.mx/>

² <http://pnd.presidencia.gob.mx/>

³ <http://www.infraestructura.gob.mx/>

- 5) To propose financing schemes and auto-sustainability to promote the implementation and development projects in the use of information technology and their operational continuity;
- 6) To develop mechanisms and optimal conditions to encourage greater investment in infrastructure development and provision of telecommunication services.

Furthermore, the Science, Technology and Innovation Special Program (*Programa Especial de Ciencia, Tecnología e Innovación 2008-2012*)⁴ aims to strengthen the social appropriation of knowledge and innovation, as well as effectively coordinate all involved parties to achieve this objective. This is also possible due to the new Law of Science and technology, published in *Diario Oficial de la Federación* on June 5, 2002. The last reform was published on 27/04/2010.

The ICT sector plays a key role in the current national development strategy, not only due to its potential growth, but also for its positive effects in other sectors and in the economy competitiveness of the country. Taking 2006 as a baseline, Mexico has been developing several efforts addressed to the definition of a public policy for the ICT sector; ICT is seen as one of the most efficient tool to trigger the enterprise's productivity all along the production chain; also useful to revert the loss of competitiveness.

Therefore, Mexico has an important opportunity to develop the ICT industry, due to many advantages that place it as an attractive country for the global market investments:

- Geographic location (NAFTA, Pacific and Atlantic coasts)
- Preferential access to world markets (12 free trade agreement -44 countries- with common legal frameworks with our major partners -USA, EU, Canada...)
- Qualified and competitive jobs
- Economic stability

On the other side, Mexico is building a national consensus to establish and execute a Digital Agenda, coherent with the aspirations for the improvement of the national competitiveness. Particularly, in Mexico programmes related to Research Innovation and Development are managed by different institutions: Research programs are mainly managed by the Mexican Council of Science and Technology (CONACYT) and Innovation and Development programmes by the Mexican Ministry of Economy (*Secretaría de Economía*).

In spite of this, there is no specific programme devoted to support *Research* in ICT. The only program providing funds for this purpose is the General Fund for Basic Research "*Fondo Sectorial de Investigación para la Educación*" SEP-CONACYT.

In terms of *Innovation* and *Development*, there is no integral strategy but isolated programmes of the Mexican Federal Government with no multiplier effect between them (See D1.2):

- CONACYT (<http://www.conacyt.mx>)
- - Apoyo a la Innovación Tecnológica de Alto Valor Agregado (INNOVAPYME)
 - AVANCE.
 - Fondo Nuevo para Ciencia y Tecnología.

⁴ <http://www.conacyt.mx/comunicacion/comunicados/47-08.html>

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- Incorporación de Científicos y Tecnólogos Mexicanos en el Sector Social y Productivo del País. (IDEA)
- Fondo Institucional de Fomento Regional para el Desarrollo Científico, Tecnológico y de Innovación (FORDECyT)
- Estímulos fiscales
- Programa de Estimulo para la Innovación (PROINNOVA)
- Mexican Ministry of Economy
(<http://www.prosoft.economia.gob.mx/acercade.htm>)
 - Programa para el Desarrollo de la Industria de Software (PROSOFT).
 - Programa Nacional de Empresas Gacela - <http://www.gacelas.org.mx/>
 - Technology Business Accelerator (TechBA) - <http://www.techba.com>
 - PROMEDIA

Ministry of Education and CONACYT (<http://www.conacyt.mx>)

- Programa Nacional de Posgrados de Calidad (PNPC)

Federal Government and CONACyT (<http://www.conacyt.mx>)

- Fondos Mixtos (FOMIX)

3.1.2 Colombia

In Colombia the Government is committed to the National ICT Plan 2008-2019 (PNTIC). This plan aims at a complete coverage of information and communication services to all Colombians, making an efficient and productive use of ICT by the end of the given period. The general objective is the use of ICT to improve social inclusion and increase competitiveness.

To achieve this goal, the ICT plan proposes a series of policies, actions and projects in eight main areas, four horizontal and four vertical. Shafts cross cover issues and programs that impact on different sectors and groups of society.

The vertical axis refers to programs that help to achieve a better appropriation and use of ICT in priority sectors for this PNTIC.

Horizontal axes are:

- 1) Community,
- 2) Regulatory framework,
- 3) Research, development and innovation and
- 4) Government on line.

Vertical axes are:

- 1) Education,
- 2) Health,
- 3) Justice and
- 4) Competitiveness.

In terms of Innovation and Development, the Colombian national funding mechanisms are as follows (for details on National Funding Mechanisms, please refer to See D1.2):

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- Ministry of Commerce, government. Industry and Tourism of Colombia
- Chamber of Commerce of Bogota – CCB
- TECNNOVA
- The Financial Fund of Development Projects – FONADE
- National Government – FNG and FNPC
- Bank of the Republic – Foundation for the Promotion of Research and Technology
- SENA – *Fondo Emprender*
- Ministry of Information and Communication Technologies (MINTIC) - National ICT Plan, *Centro de Bioinformática*, FONTIC, COLCIENCIAS.
- *Gobernación de Antioquia*, BID, Colciencias - *Centro Integral de Servicios Empresariales (CREAME)*.
- *Empresas Públicas de Medellín*, EPM Telecomunicaciones, *Alcaldía de Medellín - RUTA N.*
- *Interconexión Eléctrica S.A. (ISA)* and *Antioquia's University* – TeleMAP.

In the R&D area, the ICT plan in Colombia proposes the following objectives:

- To devote a greater share of public spending on these activities as a percentage of GDP.
- Funding programs for training workers at different levels. Training is required at PhD level in university and technical disciplines and ICT.
- The protection of intellectual property.
- To promote quality in the institutions providing specialized education for the ICT industry through the establishment of standards and quality certifications.
- To promote the creation of active relationships between companies, universities and research centres.
- Promote research and development within the companies themselves. This dimension of ICT is essential to use knowledge in improving the country's competitiveness.
- Benefit of their comparative advantages in biodiversity and the quality of research in the country.

The ICT ministry has proposed two government plans named "*Vive Digital*", focused on the maximization of Internet access for the population of the country, and "*Computadores para educar*" which aims to provide access to information and communications technologies to the country's public educational institutions, among others. In general, both plans are belong in the "*PLAN TIC COLOMBIA*"⁶

In R&D, the most relevant institution is Colciencias, a government institution responsible for funding research projects of all kinds. Other institutions like ARTICA⁷, Ruta N⁸ and CINTEL⁹ play a significant role in the ICT innovation and development.

⁵ <http://vivedigital.gov.co/>

⁶ http://www.colombiaplantic.org.co/medios/docs/PLAN_TIC_COLOMBIA.pdf

⁷ <http://www.articacdt.com/>

⁸ <http://www.rutanmedellin.org/Paginas/inicio.aspx>

⁹ <http://www.cintel.org.co/>

3.1.3 Cuba

In Cuba, innovation programs related to R&D in ICT are managed by different institutions guided and assisted by the Ministry of Information and Communications and the Ministry of Science, Technology and Environment.

Cuba has identified the main programmes for development of R&D in ICT, which are focused on:

- 1) Information Society
 - a. e-Government
 - b. e-Commerce
 - c. Cuba Network
 - d. Open Source
 - e. Citizen´s Website
- 2) Telecommunications
- 3) Automation and Robotics
- 4) Electronics
- 5) Software Development and Biomedical Equipment.
- 6) Efficient use of radio spectrum.

Some strategic guidelines of ICT R&D horizontal applications in Cuba are:

- 1) To promote projects that stimulate:
 - a. National development, acquisition of knowledge and know-how
 - b. Integration University-Industry Science and closing cycle R&D&I
 - c. Generation of technology solutions for specific niches.
 - d. Research and application development of technological innovation to decrease energy consumption and allowing rapidly development of alternative energy technologies.
- 2) Alignment with the Third Convergence of Sciences (Nanotechnology, Biotechnology, Computer Science, Cognitive Science), promoting the participation of the ICT sector in the interaction between living and artificial systems for the design of new devices to improve the cognitive and communicative capacities, health and physical conditions of people.
- 3) To define and implement a policy platform in order to benefit from the open source software to enhance own development, using a common, sustainable and safe platform.
- 4) Insertion of the R&D strategy in the curricula of Information Science, Telecommunications, Automatics and Computer Science bachelors' degrees, with emphasis on the depth of the teaching of Basic Sciences (Mathematics and Physics).
- 5) To foster international cooperation for scientific exchange, training and development of joint projects in observance of national interests and compliance with the law.

3.1.4 Costa Rica

Currently, Costa Rica has an area of ICT (also known as Digital Technologies sector or TD), which is prosperous and promotes social and economic development. The area of TD, according to the classification used by the Chamber of Information and Communication Technologies (CAMTIC), consists of 9 sub-sectors, as well as various allies and support groups. These subsectors are:

- Software developers
- Digital multimedia
- E-commerce
- E-learning
- Information technology
- Telecommunications and networks
- Commercialization of technologies
- Services enabled by digital technologies
- Manufacturing of digital components

The "digital ecosystem" of Costa Rica consists of nine sub-sectors listed above, along with the active participation of government, public institutions and academia. All these actors form an ecosystem in which there is coexistence and contribution of public and private sectors, together with the academy.

Among the various players in the digital technological task of Costa Rica, it is clear that the growth of the sector should be managed through an ecosystem in which the spaces of action between business, political decision makers, researchers, scientists, academics and society, converge to promote policies and actions, that actually push more business development of digital technologies and, at the same time, increase the contribution they make to Costa Rican society.

"The Government of Costa Rica believes it is vital to boost growth in the digital technologies sector, because it is aware of the benefits it generates in many areas of national life" (Chinchilla Miranda, Loc Cit.).

In Costa Rica, there is awareness that public policies should encourage the growth and expansion of digital technologies sector. Therefore, these policies should be timely and flexible, so they can adjust to the speed and dynamism of these technologies. In addition, a number of reports and studies that suggest routes to the country's technological development, including the Strategy XXI Century (*Estrategia Siglo XXI*, in Spanish), the master plan for Digital Government and the National Telecommunications Plan, just to name a few.

However, two recent studies propose policies related to digital technologies in Costa Rica. The first study was issued by the Ministry of Science and Technology (MICIT, for its acronym in Spanish) and is called "The National Plan for Science, Technology and Innovation from 2011 to 2014".

The second study is a proposal by the private sector, through the Chamber of Information and Communication Technologies (CAMTIC, for its acronym in Spanish) and is known as the Strategy "Costa Rica: Green and Smart 2.0".

National Plan for Science, Technology and Innovation 2011-2014

The strategic proposal for the digital sector is anchored on four pillars:

- Convene the country to consolidate a large "digital social agreement", which allows building a shared vision between government, academia, the productive sector and other civil society organizations. This "digital social agreement" would also consolidate and manage the relevant variables of a digital ecosystem development in Costa Rica, which is one of the cornerstones of national development.
- Prioritize policy and public resources towards the creation of individual and collective digital skills, both public and private, as a mechanism to ensure the use of digital technologies in all areas of society and the economy, which means a cross-use of technology. This prioritization will include aligning the formal educational platform, technical education, ongoing training programs and continuing education programs (also called further education), with emphasis on e-learning tools and other educational and teaching resources.
- Promote the intensive use of digital technologies in all economic sectors and productive activities, as a tool to strengthen innovation. This will lead innovative changes in production cycles, including the stages of preparation, pre and production, marketing and after sales. This will also get higher productivity rates.
- Implement a strategy of broad scope in the public sector, to incorporate digital technologies in internal management and services of all public institutions. This will serve as a mechanism to improve the quality of governance, efficiency, effectiveness and transparency.

In order to achieve these objectives, the National Plan for Science and Technology has the following actions:

- Improve the institutionalization of the digital sector and, consequently, the state's ability to establish policies, as well as develop and implement the regulatory framework and management of resources and projects that help promote the digital ecosystem development.
- Manage the democratization and digital access, based on the National Telecommunications Fund (FONATEL, for its acronym in Spanish) and the National Plan for Telecommunications Development. This will close several gaps in access and skills among citizens, small businesses, institutions and public sector officials.
- Manage the allocation of resources to productive enterprise projects supported by Digital Technologies.
- Encourage the promotion of respect and value of intellectual property in the country and boost interest, both among companies and the new generations in so-called "creative industries", which represent areas for development of entrepreneurship and the channelling the interest of business and investment.
- Promote the channelling of funds to finance entrepreneurship and business activities of the digital sector.
- Encourage the use of ICT in the Costa Rican government, by targeting *investment towards creating effective opportunities for the procurement of services from local businesses. This will take advantage of the purchasing power of the state to encourage local technology market development and strengthen the local business park.*
- *Promote the development of new business models in digital ecosystem of Costa Rica, to contribute to an accelerated production and social transformation.*

Development Strategy for the Digital Sector “Costa Rica: Green and Smart 2.0”

The vision that the "Costa Rica: Green and Smart 2.0" strategy proposes for the sector of digital technologies in Costa Rica is the following:

“Costa Rica will be a leading provider of products and services in innovative and high added value digital technologies, both nationally and internationally. The country will be a focal point for business and human development in an environmentally friendly, democratic and secure environment”.

This strategy focuses on two perspectives: as an economic sector and as an enabling tool for the development of the country. From the base of this new strategic vision, the country will promote the development of a Digital Ecosystem that reflects a sustainable, competitive and collaborative environment for the progress of the sector of digital technologies.

The strategy proposes a series of objectives that represent the guidelines for its implementation. Therefore this strategy proposes¹⁰:

- **To develop digital culture** in Costa Rica, changing the focus of Information Technology and Communication (ICT) **to focus on digital technologies (DT)**. This will boost core and qualitative changes in Costa Rican society and develop the capacity to transform information into knowledge, pushing the country towards an active participation in the Knowledge Society.
- **To develop entrepreneurial skills** in the field of digital technologies for the generation of **sustainable enterprises that are globally competitive** and serve as enabling tools for human development in Costa Rica.
- To build a "Digital Ecosystem" that works as a convergence space for the actors involved in the decisions that lead the digital technology industry in Costa Rica. This ecosystem will also enable the joint construction and implementation of public policies and actions, promoting the development of digital technologies.
- **To build a "digital ecosystem"** that will function as a **space of convergence** for the actors involved in the decisions that drive the digital technology industry in Costa Rica. This ecosystem will also enable **the joint construction and implementation of public policies** oriented to the **development of digital technologies (CAMTIC, Strategy and Intelligent Green Costa Rica 2.0, p. 12)**.

To achieve these objectives, CAMTIC's strategy proposes the following specific objectives:

1. Provide digital technology companies with an environment that allows them to create and grow businesses with sustainable and competitive practices.
2. Empower digital technology companies to develop more sophisticated products and services, linked to knowledge, which serve as enablers for social development in Costa Rica.
3. Promote and encourage innovation, research, development and protection of intellectual property.
4. Promote the digital technologies sector as a platform to develop other Costa Rican economic sectors, embedded in the production of products and services linked to knowledge.

¹⁰ CAMTIC, Strategy "Costa Rica: Green and Smart 2.0", p. 12.

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5. Promote the international integration of Costa Rican products and services in Digital Technologies, which allow positioning the country as a leading supplier worldwide.
6. Encourage the development of educational tools that facilitate the development of a digital culture and a Digital sector in Costa Rica, as a distinct advantage for the progress of digital technologies in Costa Rica.
7. Encourage the development of other competitive advantages that enable technology companies to position Costa Rica as a major local and international supplier.
8. Integrate and coordinate all digital technologies subsectors, as part of the Digital Ecosystem of Costa Rica.
9. Promote opportunities for dialogue and negotiation between the different sectors of the country, both political and business as well as academic and social, to improve competitive conditions for digital technologies.
10. Lead the different subsectors of digital technologies in Costa Rica, through the Chamber of Information and Communication Technologies (CAMTIC, for its acronym in Spanish).

In Costa Rica, R&D activities are funded basically through the Consejo Nacional para Investigaciones Científicas y Tecnológicas (CONICIT). Additionally, there are several private entities funding projects devoted to R&D and ICT.

- ◆ Consejo Nacional para Investigaciones Científicas y Tecnológicas (CONICIT):
 - Programa de apoyo a la pequeña y mediana empresa (PROPYME)
- ◆ Banco de Costa Rica
- ◆ Sulá Batsú
- ◆ CAATEC
- ◆ Centro Nacional de Alta Tecnología (CENAT)

3.1.5 Argentina

The Argentinean Government's S&T competencies lie at the federal and provincial levels, with the main policy making, management, promotion and coordination entities around the National government. The most relevant one is the Ministry of Science, Technology and Productive Innovation (MINCYT)¹¹. The National Congress, the House of Senators and the House of Representatives have S&T commissions, whose role are to assess the performance of the sector and to promote the legislative actions deemed necessary for its development. At the level of the provinces, some governments have agencies for the promotion and coordination of S&T activities, such as the S&T Ministry of the Province of Cordoba¹², or the Scientific Research Commission of the Buenos Aires Province (CIC)¹³. The main policies and national strategies for ICT development in Argentina depend to these two structures.

Upgrading the Secretary of Science and Technology (SECyT), in 2007, at the ministry level (MINCYT) shows the recognition of the key role of RTDI for achieving a prosperous, equitable society, being the only one of its kind in Latin America that includes Productive Innovation associated to Science and Technology. In order to contribute to meeting priority economic and social objectives, MINCYT's clear policy is to position Argentina in the high-value added segment of the global economy, and thus to invest heavily into developing its S&T system while at the same time connecting it more strongly to productive and service sectors, under the paradigm of knowledge as the axis of development. Regarding those sectors, innovation support is tilting the balance from stimulating enterprises to engage in innovative activities at all, to encouraging them to cumulative and interactive learning and innovative processes tightly linked to their ability to increase competitiveness and market shares.

The core lines of Argentinean policies are based on promoting the growth of National Science, Technology and Innovation by increasing the salaries of researchers and the provision of infrastructure, actions aimed at linking the academic and productive systems to generate public - private partnerships; the bridging of the gap existing between the big cities and the interior of the country through credit lines granted by the Federal Council for Science and Technology (COFECYT)¹⁴ whose priorities -closely addressed to regional needs- were set by the provincial authorities.

MINCYT aims to offer concrete solutions to the challenges of the society, promoting a productive initiative that ties the researchers' production to the market and the social needs. With this objective, MINCYT develops sectorial programs to promote the public-private association to solve, through strategic planning, technology inequalities in high-priority sectors such as health, agro-industry, social development, energy and environment. In order to obtain significant contributions from science and the technology to these areas, the Argentinean scientific and technology policy is focused on three technological platforms that cross the problematic before mentioned: Biotechnology, Nanotechnology and ICT.

In the following paragraphs, the most recent official documents that guide Argentinean policies in ST&I are considered, in particular those that have relation to the ICT sector. Two of them, the White Book and the National Digital Agenda, are presented in detail due to their validity and use.

¹¹ MINCYT's official website: <http://www.mincyt.gov.ar/>

¹² S&T Ministry of the Province of Cordoba's official website: <http://www.mincyt.cba.gov.ar/>

¹³ CIC's official website: <http://www.cic.gba.gov.ar/>

¹⁴ COFECYT's official website: <http://www.cofecyt.mincyt.gov.ar/>

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One of the ICT public policy foundations in Argentina is the Law of Science, Technology and Innovation (Nº 25.467/01) which establishes the following issues:

- the National System of Science, Technology and Innovation
- the objectives of the national scientific and technological policy
- the responsibilities of the National State in ST&I
- the structure and planning of the National System of ST&I
- the definition of funding schemes of the R&D activities and their evaluation

In 2005, the former SECyT, then part of the Ministry of Education (ME)¹⁵, and the related Observatory, developed the "Bases for a ST&I Strategic Plan 2005-2015" containing the core guidelines for the policies and planning of these activities. They include a series of strategic objectives and goals:

- Increasing consistency and social equality, aim RTD towards the improvement of quality of life and social development.
- Promoting sustainable development, adopt environmentally friendly technologies for the exploitation of natural resources and the improvement in the related techniques.
- Moving towards a new productive specialisation profile, with further incorporation of knowledge.
- Fostering access to a knowledge-based society and economy, increase public and especially private RTDI investment, and the number of researchers and technologists.

In 2006, the "Strategic Plan on Science, Technology and Innovation "Bicentenario" (2006-2010)" was launched. This Plan takes some inspiration, e.g. from European foresight studies and projections, and has four major components and foci: Global scenarios; Agro-Food; Industrial Sector; and Higher Education.

Articulated to MINCyT, the National Agency for S&T Promotion, "La Agencia" (ANPCyT)¹⁶ is a major funding agency concentrating the implementation of S&T research, and innovation instruments, with the following main programmes:

- **FONCyT** (*Fondo para la Investigación Científica y Tecnológica*) supports projects and activities that generate new scientific and technological knowledge carried out by researchers from public and private institutions located in the country.
- **FONTAR** (*Fondo Tecnológico Argentino*) manages funding from different origin, public and private to help innovative technological entrepreneurs.
- **FONSOFT** (*Fondo Fiduciario de Promoción de la Industria del Software*) is a software industry trust fund that aims at boosting the strengthening of software-related activities nationwide.
- **FONARSEC** (*Fondo Argentino Sectorial*) aims to improve the sector competitiveness, offering solutions to the identified problems and giving answers to the community supporting projects and activities to develop capacities in areas of high potential impact and with a permanent transfer to the productive sector.

¹⁵ ME's official website: <http://www.me.gov.ar/>

¹⁶ ANPCyT's official website: <http://www.agencia.mincyt.gov.ar/>

The White Book

The "White Book of ICT Prospective. Project 2020" presents a foresight exercise on ICT in Argentina in 2008. Departing from an initiative of the MINCyT, this work is the outcome of the consultations to more than 150 relevant stakeholders from the academic sector, public sector, industry and the IT community that sought to identify technologies, entrepreneurial and application areas that should be promoted primarily in Argentina in the ICT area in the coming years. For this purpose research lines were detected for further promotion, the education needed for the development of ICT was described, and the promotion of the interaction between public-private and academic sectors was developed.

The method applied to prepare this book was to study the application, technology and transversal areas. The application areas under study were the following ones: Industry, Agro, Government, Services, Contents and Security. The technology areas are: Software Engineering, Signal, Image Technologies, Embedded Software, Micro and Nanoelectronics. Finally the transversal areas: Education and Human Capital, Innovation and R&D and Diaspora.

The integration of documents among sectors was developed by means of a three-dimensional matrix that identifies critical areas and technologies foci. In the critical areas, the intersection of the cross-sectional areas of application and technology (walls of the cube) and the technological foci (floor), the intersection of technologies and applications were found. After reviewing overall trends, the application, technology and transversal areas were presented, in order to establish the proposed actions dividing technological focus of critical areas.

In the application areas, emphasis was placed in market analysis. For example, in the case of IT services three variables that turn Argentina into an attractive target for the growing global trend, focused on outsourcing-off sourcing, such as capabilities of suppliers, cost and communication. They are struggling to meet this demand, particularly because they lack human capital, thus opening the game to new players. The domain of "open-source", technology which increasingly transcends the realm of Linux, as well as the country's human resources are irreplaceable skills in the world of IT services and is a strength to be harnessed by the country. The biggest threats to the development of this sector in Argentina come from the shortage of trained human resources in the area (under 10,000 new incomes into the market per year) and macroeconomic conditions in the exchange rate.

In the case of technology areas, the situation of the discipline was presented. For example, it was performed a prospective analysis of software engineering as a discipline, trying to identify those aspects that are relevant to the development of software industry and ICT in Argentina. After explaining why Software Engineering is fundamental to the development of software, industry and ICT a set of proposals and measures are submitted. The areas of software engineering, that are emerging as opportunities for Research and Development, are being analysed.

Finally, cross-sectional areas were analysed as providers of solutions for applications and technologies. In the case of the Diaspora, it was analysed how a process of brain drain can be used to raise the profile of the country's productive specialization. The "brain gain" would take advantage of critical resources, such as Argentinean professionals abroad and their networks, so as to modify its specialization profile of the country. While Argentina compares favourably with other Latin American countries in terms of educational level of its human resources, has a poor efficiency in terms of the use of these assets due to the predominance of a non-intensive profile of specialization in knowledge, lack of coordination between

education and productive system, difficulties to overcome the limitations of the linear model of innovation, and to link science, technology and social and productive development.

In the final comments, it is postulated that the future of ICT in 2020 is more closely linked to requirements, restrictions on learning and economic and social development than scientific and technological challenges. At the same time, new inventions and results seem to strongly influence, as never before, in shaping this new society, generally called "Knowledge Society". It was proposed that the main challenge for Argentina in terms of Science and Technology is to change the model of RTDI. A cultural revolution is an unavoidable precondition to overcome a delay of 40 years in the next 20. This transformation can be summarized as the passage from linear to non-linear paradigm of research and development. To accomplish this objective, the following conditions must be taken into account:

- 1) Encourage research primarily in the "cutting edge" of science and technology, to achieve the best global level in competitive specializations in "key" areas. That is to "focus".
- 2) Promote training of human resources capable of carrying out the lines of fundamental research and development related to specialization, but also for the production and marketing of results.
- 3) The States, at all levels, must explicitly intervene not only in their role as provider of education and science and technology sponsors, but it is also essential to use its enormous power to guide and fund strategic and complex projects in key areas to generate major challenges for the scientific and technology companies.
- 4) Internationalizing firms and R&D centres.
- 5) Encourage the creation of new businesses and technology clusters and strengthen existing ones.
- 6) Encourage the culture of scientific and technological evaluation, consistent with the pursuit of a change in the paradigm
- 7) Invest the necessary resources for analysis, planning, promotion and exploration in science and technology and provide long-term support in terms of equipment and plans
- 8) Set, prioritize and sustain R&D programs aimed at multidisciplinary specializations. Not from the "scientific supply" but mainly on the demand for knowledge and solutions required by the specializations.
- 9) Build effective and efficient mechanisms for searching, finding and supporting projects, companies, equipment, people and innovative regions. It is not reasonable to devote all the resources to "open and transparent calls", or calls on general topics.
- 10) Generating conditions, and intervene heavily from the state for the creation and maintenance of a risk capital market-oriented to technology.
- 11) Adopt proactive policies regarding intellectual property rights, both at the local and at regional and international levels.
- 12) Develop effective and efficient actions for dissemination, promotion and integration of technology in society. Promote and encourage the productive use of technology demand.

On October 26, 2009, this book was officially presented by the Minister in Science, Technology and Productive Innovation, Dr. Lino Barañao, in the Centro Cultural Borges.¹⁷

National Digital Agenda

¹⁷ More information about the presentation and the individual panelists at http://www2.mincyt.gob.ar/index.php?contenido=noti_libro_blanco

Led by representatives from all ministries and designed in collaboration with business councils, representatives from the academic and scientific community, NGOs and community organizations, Argentina produced its first National Digital Agenda¹⁸, which was officially launched on 8 May 2009 by the President Cristina Fernández¹⁹ with the Decree N° 512/09.

The Digital Agenda was thought as a federal plan promoted by the national government, which seeks to increase the strategic use of ICT to generate development, to promote strategic investment, and to foster social inclusion. It is focused on six strategic spheres: government (including education, justice, health and security), ICT industry, research and innovation, environmental control, and civil society.

This document is not presented as a closed document; it is a process, a collaborative construction, open and ongoing. Multisectorial working groups continue running in order to update the original plan and elaborate technological analysis and proposals to be presented in periodic meetings. This group puts at the disposal of its members a space of collaborative virtual work in the official website, with the aim of facilitating the exchange of information.

This initiative was welcomed from all sectors since the socio-political and economic crisis that Argentina underwent in 2001 brought about a temporary postponement of the plans and programs focusing on ICT. Since 1998, partial programs had been developed in Argentina related to the Information Society (IS), in different jurisdictions, with a development taking parallel work strategies, with own visions, agendas and projects. This National Digital Agenda aims to bring a national strategy with an integrative vision and joint participation.

3.1.6 Brazil

The Action Plan for Science, Technology and Innovation (PACTI 2007-2010) that was launched in November, 2007 is part of the set of plans developed for the second term of the government of President Luiz Inácio Lula da Silva (*Programa de Aceleração do Crescimento* - PAC). This aimed to implement a large number of projects and at the same time generate and encourage investment in the infrastructure of transport, energy, housing and health in order to give Brazil the opportunity to broaden and sustain rates of economic growth.

ICT industry development and digital inclusion strategies were part of this planning effort which was to be updated in a Blue Book published after a series of regional and sectorial meetings in 2010, as a result of the 4th National Conference on Science, Technology and Innovation (CNCTI) put to public consultation on the Internet in late October. The process of public consultation is part of the process of open discussion of the 4th CNCTI. The book says national science policy should be guided by two key areas: innovation and sustainable development. Another goal is investment in work on under-researched areas central to the country's development, such as marine sciences and the Amazon. Much of Brazil's 8,000-kilometre coastline is understudied, while the book says that Brazilians no longer

¹⁸ Digital Agenda's official website: <http://www.agendadigital.ar/> The site outlines the main working groups: Human Capital, Content and Application, Infrastructure and Connectivity, Finance and Sustainability, Legality.

¹⁹ Video of the Digital Agenda presentation at <http://www.en.argentina.ar/en/country/C1904-argentina-digital-agenda-has-been-presented.php>

view the forest as a source of wood but of new medicines. The book also explores the relationship between universities and the private sector, proposing the creation of institutions that can facilitate public-private dialogue.

The Conference has directed discussions along the lines of PACTI 2007-2010, namely:

- a) The national system of science, technology and innovation,
- b) Innovation in Business and Society;
- c) Research, Development and Innovation in Strategic Areas and
- d) Science, Technology and Innovation for Social Development.

The Blue Book is the most accomplished trend setter and overview of the Brazilian science, technology and innovation framework and is a pre-requisite for the understanding of ICT priorities in the country. It requires the adoption of a long-term agenda that includes: the consolidation of a National System of Science, Technology and Innovation, strengthening coordination among various sectors involved and reviewing legal frameworks that still hamper the research and development technology, businesses and educational institutions and research, the encouragement of technology; stimulating innovation in enterprises, the support of science and technology for social inclusion, encouraging innovation in this area, the sustainable use of national biomes, including the sea and the ocean, the promotion of development projects in the Amazon region, which enhances biodiversity and prevents the destruction of forests; improving the quality of education at all levels and the substantial increase in the formation of qualified labor markets via high school and higher education, increasing the number of researchers in companies, institutes and universities and last, but not least, the intensification of programs designed to reduce the country's regional imbalance in science and technology activities.

The Blue Book is also keen on recommendations for ICT policies and strategies. ICT policies are regarded as a challenge that requires continuous efforts that need to move simultaneously in different directions and in different regions of the country. These developments represent opportunities, which can be exploited or "threatened with obsolescence and destructive competition, and therefore the country needs to be agile to absorb them and adapt them to national needs".

The effective exploitation of the potential offered by ICT also depends "on the universalization of skills and digital literacy among workers and citizens, as well as the access to an efficient communications infrastructure by individuals, businesses, schools and public institutions". To move forward simultaneously on all these fronts is a necessary condition for the country to actually benefit from these technologies, identified as the basis of an emerging knowledge economy or society.

The Blue Book is to this date the most relevant summary view of the policy framework for science, technology and innovation in Brazil, but there is not an outstanding emphasis on ICT. A more detailed understanding of national policies in this area results from the reading of reports published by individual institutions such as the "Renato Archer Information Technology Center", one of the leading research agencies funded by the Ministry of Science and Technology.²⁰ The annual report for 2010 showcases 68 projects in areas such as microelectronics, software, applications and participation in research networks. They compose a wide range of expertise in areas such as design of electronic circuits, new materials for electronic

²⁰ Available at http://www.cti.gov.br/images/stories/cti/noticias_eventos/pdf/2011/relatorio_anual2010_Online.pdf

packaging, environmental regulations for electronics, IT for government, education, social inclusion, medicine, robotics, photovoltaic energy, software qualification, security information and management. Most of them are conducted in partnership with business, government and relies on funding from development agencies such as CNPq, FAPESP and FINEP, other organs such as the Health Ministry and the Superior Electoral Tribunal, as well as private companies.

Government ICT spending reached US\$1 billion between January and July 2009, (ICT consulting accounted for about half of the expenditures). An expansion of e-government and government functions has led to an increased data flow, driving demand for renewal of outdated networks, systems and servers. According to government targets, the domestic software and services industry should generate 100,000 jobs and an additional US\$1 billion in revenues by 2010, and an agreement to train 10,000 IT programmers in 2009 was signed to help achieve these goals.

One of the most important Government initiatives so as to foster ICT penetration across value chains with strong presence of SMEs has been the creation of Information and Business Telecenters – TINs. These provide courses and training, in person and at a distance, information, services and business opportunities, in order to create better competition conditions for micro and small businesses, and promote new undertakings.

They function as an instrument to bring together businessmen, public and private institutions, non-governmental organizations (NGOs) and the society in general. Equipped with several computers interconnected in local networks and connected to the Internet, there are trained instructors to attend to the needs of its users.

In order to promote the creation of more Telecenters in Brazil, Decree n. 6,991, from 27/10/2009 was published, which institutes the National Program from the Federal Government to Support Digital Inclusion; following this initiative, an additional document was published in the Official Federal Gazette, in 24/02/2010, Section 3, pages 130 to 135, the publication of Telecentros.br, which outlines new procedures for the approval of applicants to the Program and for the request of funds available to telecenters. Through this publication, the government expects to create three thousand new Telecenters and better conditions to reequip the existing 5.6 thousand

The government also continued to roll out its *one-computer-per-student program (or UCA – Um Computador por Aluno)*, which received a funding of US\$50 million and has led to a specific call for projects by the National Research Council in 2011. Public schools are increasingly purchasing low-cost portable computers. However, a lack of content and even training materials for teachers and school labs was felt from the start. In January, 2011, the National Research Council (CNPq) published a call for projects to explore content production and educational methodologies for the UCA platform, budgeting R\$ 5 million for the 2011-2012 period (about US\$ 3 million).

The National Social and Economic Development Bank (BNDES) also offers since 2010 a funding scheme (R\$ 650 million or US\$ 385 million with a 3 years duration, mostly for public administration entities) for the adoption of the UCA platform via acquisition of computers. So far, 32 municipalities have submitted requests to the Bank, which corresponds to 210,000 computers.

Brazil has a large number of public and private funding R&D mechanisms, as well as some financing programs with mixed funding from public and private organizations.

Identification and Analysis of ICT research priorities

From these, several Ministries stand as major sources of financing for R&D and ICT projects and activities, through several institutions (for more information please refer to D1.2):

- Ministry of Science and Technology
 - Fundo Setorial para Tecnologia da Informação (CT-INFO)
 - Fundo Setorial para o Audiovisual (CT-FSA)
 - Programa de Subvenção Econômica
 - The National Council for Scientific and Technological Development (CNPq)
- Ministry of Communications
 - Fundo para o Desenvolvimento das Telecomunicações (FUNTTEL)
- National Education and Research Network (RNP)
 - Inter-Ministries Program MEC/MCT
- Ministry of Development, Industry and Foreign Trade (MDIC)
 - BNDES – The National Economic and Social Development Bank
- Ministry of Culture
 - ICT-related projects, events and research in areas such as digital TV, digital divide, cultural heritage and open source software.
- National Economic and Social Development Bank
 - CRIATEC is a funding agency created by an alliance of BNDES, BNB (Bank for the Northeast of Brazil) and private investors seeking opportunities in highly innovative start-ups.
- Internet Steering Committee in Brazil
 - Multistakeholder organization composed by members of the government, the enterprise sector, the third sector and the academic community.
- Government of the State of São Paulo
 - The Technological Research Institute (Instituto de Pesquisas Tecnológicas)
 - The State of São Paulo Research Foundation (FAPESP)

3.1.7 Chile

The national system of science and technology in Chile is based on the participation of public and private entities, such as government agencies, universities, institutes and research centres. This system seeks, on the one hand, to develop research, technology, human capital formation and innovation, and the other hand, the creation of policies to support these aspects.

Regarding the strategies for ICT development, Chile has always had a proactive attitude. In the early nineties, the Chilean Government decided to deregulate the Telecom industry with the goal to foster the development of this industry. Chile is a long country and the distance among diverse cities is big, thus it is necessary to develop ICT with the goal of reaching the marginalized population. For this reason, during the nineties, the program "Telecommunications Development Fund" was launched. After that, "Enlaces Projects" was started with the goal of connecting 350 public schools through a WAN with the goal of bringing computer applications to their students. In spite of the fact that many schools had to reduce the usage because the high cost, the program opened its scope to all public schools.

Recently, the Chilean Government is trying to organize a plan with the objective of digitalizing the country. In order to get this goal, a Digital Agenda was introduced in February 2010, which includes 34 initiatives divided in 6 action areas, including access, e-government, education and training, ICT industries, businesses and legal and regulatory framework.

The new digital Agenda to the period 2010-2014, which gives a new approach in TIC, incorporate a digital vision of the Society and the State. The main goal of the Chilean state is to put Chile into the Knowledge Society and the new paradigms by 2020.

There are two lines of public policy for the period 2010-2014 on Digital Development:

- 1) To support the modernization of the State Administration, which have to focus on service to the people, the efficiency in processes, to streamline digital platforms, the interoperability of the State and the generation of timely, transparent and easy information to be used for citizenship and the government (e-Government).
- 2) To deepen the use of ICT by companies under the paradigms of the knowledge society, working especially in education, health, entrepreneurship, innovation, job creation and improvement of competitiveness (e-Society).

A number of targets have been set up for December of 2013, given that the period of the current administration ends on March 11, 2014. These goals integrate initiatives and digital development projects, according to the lines of public policy described above.

There are not clear strategies at corporate or business association's level for ICT industry development. Most ICT companies are part of the Chilean Association of Companies in ICT (ACTI²¹) or the Chilean Society for Software and Services (GECHS²²). These companies are focused on providing particular ICT services to public and private organizations, or to citizens. While ACTI groups the big companies, GECHS meets small and medium enterprises and this means that

²¹ See: www.acti.cl

²² See: www.gechs.cl

Identification and Analysis of ICT research priorities

these business associations have different goals because they represent diverse interests. Regardless this, in the present there are efforts to work for common objectives.

Chile has several financing mechanisms, most of them public funds managed by CORFO, SUBTEL and FONDEF.

Corporación de Fomento de la Producción (CORFO)

- Technological Diffusion Program
- Development of technical Capacities of Human Capital in relevant sectors
- Technological missions
- Specialized consultancy: Supports the recruitment of international experts, whether domestic or foreign, whose knowledge and capabilities are not available in the country. This effort aims to solve specific problems whose solution is applied immediately, with the aim of increasing the competitiveness of the applying companies.
- Technology Internships
- Technological nodes: Supports the work of organizations dedicated to promoting technological innovation and productivity of SMEs

Subsecretaría de Telecomunicaciones (SUBTEL)

- Fund of Development of the Telecommunications

FONDEF

Fundacion Chile

- *Soy Emprendedor*

3.2 The view of ICT researchers and stakeholders

The development of science, technology and innovation should definitely be the key in the development of Latin-American countries. This is known as a joint development, more comprehensive, where both the technology and innovation grow in common harmony, supporting the promotion and development of countries, which implies greater investment in research and technological development in the ICT sector.

The public, private and academic policy makers are aware of the potential of ICT in every country and have promoted some actions to improve the development of the ICT sector. However, it is necessary to encourage the investment in ICT research and innovation, and prevent countries suffering a decline in development indicators by promoting a common synergy between the EU-LA regions.

In this section we present the view of the researchers and stakeholders of each target LA countries, based on the following:

- The national policies that have been previously analysed (D1.2 and D1.3)
- The PRO-IDEAL PLUS survey on ICT priorities (June 2010)
- The results of the Round Tables (May-June 2011)

3.2.1 Mexico

The document *Visión México 2020, Políticas Públicas en Materia de Tecnologías de Información y Comunicaciones para Impulsar la Competitividad en México*²³, is an important effort for the national agenda for ICT public policies, in order to close the digital gap and to boost the economic development of the country through the competitiveness and productivity that ICT can produce. It is mainly promoted by the private sector.

Closely related, and as a continuity of the ICT sector efforts the National Digital Agenda (Agenda Digital Nacional²⁴) was recently published –April 2011. The National Digital Agenda is the joint effort of the different sectors involved in the promotion of the transition to an information and knowledge society. Its major objective is to align objectives, policies and actions of all the stakeholders under the principle that ICT is a key factor to encourage competitiveness.

Complimentary, a Technological Road Map (lead by PROMEXICO) is being elaborated taking in account the current importance of the software industry in Mexico. The Mexican software industry is composed by a large amount of SME's mainly focused in the production of services. An important proportion of the software production of the country is for *in house* consumption, that's why big companies from different sectors develop or adapt software programs and IT services for their own needs.

The manufacture industry is one the major users of the software development services; the development of IT local industry would be strongly favoured if an increase in the software demand of specialized industries would be possible (automation industry). That's why the private sector and the academia began to elaborate a Technological Road Map, to lead the strategy to follow to encourage the development of the software for advanced manufacturer industry.

²³ 2006. AMITI, CANIETI, FMD

²⁴ www.the-ciu.net/nwsltr/ADN.html

Round Table highlights

During the first Round Table in Mexico, some topics were considered relevant by different actors about the ICT policies in the country:

- 1) To create a main Mexican coordinating entity in ICT.
- 2) To create a complete map of the ICT R&D capacities in Mexico.
- 3) To implement an integral research plan in universities for graduates, bachelors' programs do not encourage a R&D environment.
- 4) To align university needs with business needs.
- 5) More and better use of ICT for scientific and technological exchange between MX-EU, by using remote laboratories, as well as telepresence exchanges.
- 6) The Mexican's Senate proposed and approved a law to create Technology Transfer Centres (CTT) to incentive technological development.
- 7) To promote the training of human capital with high level in ICT, it is necessary to implement master and doctoral programs that meet specific requirements of R&D.
- 8) Researchers must be evaluated not only for its scientific production (papers), they need to include patents applied in research topics that create high impact in global concern.
- 9) To build communication mechanisms allowing an extensive participation of existing communities in R&D.
- 10) To define priority areas to generate focused R&D activities, projects and publications.
- 11) There should be a web portal to publish supply and demand.
 - a. Mandatory to successfully disseminate stories to generate enterprises concern.
 - b. Many countries are turning their investigation in a targeted manner.
 - c. To create synergy between research and technological development.
 - d. Communication between government and industry fail.
- 12) To generate ecosystems encouraging innovation and research.
- 13) To place Mexico in a global value chain.
- 14) Generation of statistical information on ICT in Mexico.
- 15) To generate technology foresight considering the geographical conditions of the country.
- 16) To generate a National policy of *e-Infrastructures* that defines the necessary elements to share public information, making available for the information society.

Following, we mention the main ICT policy makers and stakeholders in Mexico.

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. CANIETI is a public interest, autonomous institution with legal status and capital of its own, different from that of its members, established according to what is provided in the Act of Business Chambers and their Confederations. 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 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. Its mission is to take the leadership in the IT industry, to collaborate with Government, Academy and users to promote the use of the country information structure to facilitate the country competitiveness as well as the growth of IT industry and their participants.
- **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 enterprises. The last in strategic areas in order to reach structured and articulated national development. This network is currently made up by an academics-technical committee whose members were responsible for the proposed mining project.
- **La Corporación Universitaria para el Desarrollo de Internet (CUDI)** www.cudi.com.mx: manages the Internet 2 project 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 centres of the country and some companies.

Companies of the ICT sector

IT Components

- **Intel Tecnología de México, S. A. de C. V.** (www.intel.com): Have the intel centre resources created just for IT professionals. 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): It was founded in 1960 to manufacture electronic and electromechanical components.
- **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 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 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): 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..
- **Dell México, S.A. de C.V.** (www.dell.com.mx): DELL is one of the two largest computer hardware manufacturers worldwide.
- **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. 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.
- **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.
- **Eads Telecom México, S.A. de C.V.** (www.eads.net):
Eads is a global leader in aerospace, defense and related services. Some of their strategies include maintain and develop intrinsic skills and technologies for the architecture and integrations of platforms and platform- based systems.
- **Iusacell** (www.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..
- **Telefónica Mexico -Movistar** (www.movistar.com.mx):
Movistar is an international fixed and mobile telecommunication provider, with presence in 13 countries.
- **Unefon** (www.unefon.com.mx/index):
Is a company currently offering telephone services focused on unit rates in Mexico and 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.
- **Telmex** (www.telmex.com):
This company controls around 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.
- **Telcel** (www.telcel.com):
Telecommunication company offering mobile radiotelephone service.
- **Nextel** (www.nextel.com.mx):
Nextel is one of the distributors of Mobilcom is Tricom Network S.A. of C.V. It currently offers four digital services on a single equipment: Direct connection, telephone network access, messaging, Nextel online.

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 funds 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-lasociedad-de-la-informacion-y-el-conocimiento>):

It is a unit designed to secure the transport infrastructure and modern communications to help develop the country sustainably preserving the environment and security. Should extend the coverage and accessibility of services. 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.

Main Higher Education Institutions

- **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.
- **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.
- **Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM)**- <http://www.itesm.mx>
Having 32 campus all around Mexico, has promoted the development in ICT by developing academic programs, research and development for the country. Grouping its 32 campus, it has the most important ICT faculty in Mexico
- **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.

Research organizations (public and private)

- **Centro de Investigación 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 at national and international level.

Entities participating in R&D projects

- Research in Mexico is still very restricted to the central region; around 75% of all research funds are concentrated in this region. There exist only few funding programs which are used for ICT R&D and Innovation projects: sector funds: the federal fund for basic research; mixed funds financed by the Federation and the Regional States. Information about the participation by entities in these funds is only partially available.
- The entities which participate most in the last calls of national funding programs for basic research are INAOE²⁵, CINVESTAV²⁶, UNAM²⁷, IPN²⁸, Benemérita Universidad Autónoma de Puebla, Universidad Autónoma de Nuevo León, CICESE²⁹, ITESM³⁰. There exists also participation from regional universities but at a much lower level, like Universidad Autónoma de Zacatecas, the Universidad de Sonora, and the Universidad Autónoma de Ciudad Juárez.

Other reference institutions

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 funds 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 funds coming from federal and regional governments. It has more than 35 organizations and more than 700 employments.

²⁵ Instituto Nacional de Astrofísica, Óptica y Electrónica. <http://www.inaoep.mx>

²⁶ Centro de Investigación y de Estudios Avanzados del Instituto Politécnico Nacional. <http://www.cinvestav.mx/>

²⁷ Universidad Nacional Autónoma de México. <http://www.unam.mx/>

²⁸ Instituto Politécnico Nacional. <http://www.ipn.mx/>

²⁹ Centro de Investigación Científica y de Educación Superior de Ensenada Baja California. <http://www.cicese.edu.mx/>

³⁰ Instituto Tecnológico y de Estudios Superiores de Monterrey <http://www.itesm.mx>

3.2.2 Colombia

The Round Tables held in Colombia on June 24th, 2011 were an excellent opportunity to understand the views of researchers, as well as the most important national stakeholders, including representatives of ARTICA, UNE, Cintel, IPS Universitaria, among others.

Round Table highlights

In the Round Table the following topics were consider relevant about the ICT policies in the country:

- 1) Improvement of the ICT culture by teaching the concept of R&D since the primary education and in an attractive manner.
- 2) A technological observatory is a priority to avoid duplication of jobs and resources.
- 3) Promotion of the creation of Living-Labs and Smart Cities encouraging the interaction with similar entities at the European Union.
- 4) Promotion of the networks of collaboration.
- 5) The necessity of fostering the innovative culture among all the country.
- 6) In Colombia, innovation is a product, but there is no market for that product.
- 7) There is no penetration of innovation in SMEs.
- 8) In free trade, the recognition of qualifications in ICT is important, in order to have a global knowledge.
- 9) Diagnosis of the productive chains of sectors, in order to help start-ups focused on those needs.
- 10) Creation of training missions in the country's priority areas.

In order to highlight the most important ICT researchers and stakeholders in Colombia, it is useful to identify the main actors in the ICT field. The most important policy maker in Colombia is the Congress of the Republic of Colombia, who meets with various functions, allowing not only playing the role of the legislature but also giving enough power to oversee and monitor the executive branch. The Congress serves as a constituent, whereby the power to make amendments to the Constitution. It also meets the legislative function, ie it has the power to make laws.

- **ICT Ministry:** The Ministry of Information Technologies and Communications, according to Law Act 1341 or ICT, is the entity responsible for design, adopt and promote policies, plans, programs and projects in the field of Information Technology and communications. Among its functions is to increase and facilitate access of all inhabitants of the country to the Information Technologies and Communications and its benefits.
- **Ministry of Social Protection:** Guiding the Social Protection System and the Social Security system towards integration and consolidation, by applying the basic principles of universality, solidarity, quality, efficiency and equity in order to have a comprehensive risk management and provide social assistance the Colombian population.
- **Ministry of Education:** Some of the ministry responsibilities related to ICT are:
 - Formulate national policy on education, regulate and establish technical criteria and qualitative parameters that contribute to improving access, quality and equity of education, integrated care and early childhood at all levels and modalities.

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- Prepare and propose development plans for the sector, particularly the National Education Development Plan, calling for local authorities, educational institutions and society in general, so as to meet the needs of economic and social development.
- Promulgate rules for the organization, pedagogical and technical criteria for comprehensive early childhood and the different modes of delivery of educational services, to guide education in the preschool, primary, secondary, higher and comprehensive care early childhood.
- **Ministry of Commerce, Industry and Tourism:** The Mission of the Ministry of Commerce, Industry and Tourism is supporting the business, producing goods, services and technology and tourism management in the regions of the country to improve its competitiveness, sustainability and encourage the generation of value added, which will consolidate its presence in the local market and international markets, taking care of adequate competition in the local market, benefiting consumers and tourists, helping to improve Colombia's international position in the world and quality of life of Colombian people.

Support to science, technology and Funding Programmes

- **Colciencias:** Promotes public policies to promote STI in Colombia. Activities around the fulfillment of its mission to arrange promotion policies involve the production of knowledge, build capacity for CTI, and promote circulation and uses thereof for the development of the country and welfare of Colombians.
- **SENA:** Meets its role for the State to invest in the social and technical development of Colombian workers, offering training and performing the integral for the inclusion of people in productive activities that contribute to social growth, the country's economic and technological.

Beneficiaries of national Funding Programmes

- **Excellence Centers (ARTICA):** ARTICA is the Technology Development Centre of Excellence in ICT, supported by COLCIENCIAS and the Ministry of Information Technologies and Communications of Colombia. ARCTICA develop applied research projects with potential sources of innovation in health, education, entertainment, logistics and the ICT sector itself, mediated by ICT.
- **Innovate Research Centers (RUTA N, CINTEL):** *Ruta N Medellin* is the centre of innovation and business of the Municipality of Medellín, which promotes new knowledge-based businesses with international participation, by promoting, developing and strengthening the ecosystem of science, technology and innovation. CINTEL Research Centre of telecommunications studies and promotes the full use of Information and Communications Technologies (ICT) through four lines of action: Research and Innovation, Technical Assistance and Training and Information Services.

3.2.3 Cuba

The Round Tables held in Cuba on June 14th, 2011 were an excellent opportunity to understand the views of researchers, as well as the most important national stakeholders, including representatives of MIC, AVANTE, Citmatel, CEDAI, Softel, CUJAE, Universidad de la Habana, UCI, among others.

Round Table highlights

In the Round Table some topics were considered relevant by different actors about the ICT policies in the country:

- 1) To link the training with the requirements of the market.
- 2) To stimulate the linking between universities and enterprises.
- 3) To stimulate a bigger participation of the companies in the activities of the universities and vice versa.
- 4) To stimulate training in the Administration of Projects and in the Commercial activity.
- 5) To stimulate the activities of I+D in the companies.
- 6) To stimulate the agreements of collaboration between the universities and the companies and international character agreements.
- 7) To stimulate a bigger remuneration to the human resources.
- 8) To encourage the creation of technological parks.
- 9) To create mechanisms of "Spin Off" resulting from R&D.

In order to highlight the most important ICT researchers and stakeholders in Cuba, it is useful to identify the actors in the ICT field:

Policy Makers,

- Ministry of Science Technology and Environment. <http://www.citmahabana.cu/>
- Ministry of Informatics and Communications. <http://www.mic.gov.cu/>
- Higher Education Ministry. <http://www.mes.edu.cu/>

Stakeholders (Institutions for public administration and beneficiaries).

- **Universities:**
 - Universidad de la Habana. <http://www.uh.cu/>
 - Universidad de Ciencias Informáticas (UCI). <http://www.uci.cu/>
 - Universidad Central de las Villas. <http://www.uclv.edu.cu/>
 - Universidad de Oriente. <http://www.uo.edu.cu/>
 - Universidad de Pinar del Río. <http://www.upr.edu.cu/>
 - Universidad de Ciego de Ávila. <http://www.unica.cu/#bienvenido.html>
 - Universidad de Cienfuegos. <http://www.ucf.edu.cu/>
 - Universidad de Matanzas www.umcc.cu
 - Universidad de Holguín www.uho.edu.cu
 - Instituto Superior Politécnico José Antonio Echeverría. <http://www.cujae.edu.cu>
 - Instituto Superior de Ciencias y Tecnologías Aplicadas www.energia.inf.cu/instituciones/isctn
 - Instituto Superior Minero Metalúrgico de Moa www.ismm.edu.cu

- **Research Centres:**
 - LACETEL <http://www.lacetel.cu>
 - ICIMAF <http://www.icmf.inf.cu/>
 - ICID www.icid.cu/
 - BioInfo <http://www.bioinfo.cu/>

- **Companies:**
 - SOFTEL <http://www.softel.cu>
 - ETECSA www.etecsa.cu
 - FORDES <http://www.fordes.co.cu/Inicio/>
 - Cubatel <http://www.cubatel.cu/>
 - CITMATEL <http://www.citmatel.cu>
 - CEDAI www.cedai.com.cu
 - DESOFT www.desoft.cu
 - Segurmatica <http://www.segurmatica.cu>
 - COPEXTEL www.copextel.com.cu
 - GEOCUBA www.geocuba.cu

3.2.4 Costa Rica

Costa Rica is known for the high quality of its human resources and its potential in the development of ICT. The public, private and academic policy makers are aware of this potential and have promoted some actions to improve the promotion of the ICT sector. It is necessary to promote the integration of knowledge in productive and service sectors, since they are the current country's productive base. It also calls for the creation of new enterprises and the encouragement of knowledge sectors. Priority is to strengthen investment in research and development, promote business innovation, links between research and production activities and the strengthening of the "digital ecosystem" and entrepreneurship.

The shortage of human resources, limited access to financing, the weaknesses in the policies of intellectual property protection and minimal linkage between business, academia and government, are some areas of risk for the development of ICT in Costa Rica, they also limit growth and investment in R&D.

Round Table highlights

In the Round Table the following topics were consider relevant by different actors about the ICT policies in the country:

- 1) Creation of a single key for access to information on cooperation with EU.
- 2) There are good initiatives to access funds from international cooperation
- 3) It is important to prioritize (national) sectors that should be subject to European Union funding
- 4) Costa Rica should guide their participation in FP7 projects as a partner, using the leverage that other countries can give to a project.
- 5) Costa Rica should emphasize efforts to define policies and joint programs (government, academia and industry) in research, development and innovation.
- 6) Academia should include topics of entrepreneurship and innovation in all the plans.
- 7) It is vital to encourage the creation of laboratories and research spaces in academia, government, private enterprise, local governments and civil society.
- 8) To define (academa, government and industry) priority areas to generate focused R&D activities, projects and publications.
- 9) Creating Networks of collaboration between academia, government and industry
- 10) There is general culture of innovation but it definitely must be promoted
- 11) To promote the use of digital technologies and innovation in SMEs
- 12) Costa Rica has a great potential in human resources devoted to science and innovation
- 13) To promote the training of human resources in technical level in ICT
- 14) To generate statistics about ICT sector.

In order to highlight the most important ICT researchers and stakeholders in the country, it is useful to identify the actors in the ICT field:

Policy Makers

- **COMEX (Ministry of Foreign Trade):** It is responsible for the formulation, planning and policy direction of trade, investment and foreign economic cooperation in foreign trade.
- **MEIC (Ministry of Economy, Trade and Industry):** The Ministry of Economy, Trade and Industry MEIC is one of the ministries that make up the executive branch of Costa Rica. It is responsible to encourage and support economic and social development through policies that facilitate the proper functioning of the market, consumer protection, regulatory improvement, promoting competitiveness and boosting business. Provide information relevant, timely, fast and accurate under the platform that our society requires for decision making and research.
- **Ministry of Education:** Its purpose and goal is to make education the core of sustainable development. Educational Policy towards the XXI Century is a groundbreaking effort to establish a long term framework for the development of Costa Rican educational system that will bring the constitutional mandate to the specific reality of today. It was approved by the Higher Education Council meeting in No. 82-94, on November 8, 1994. Was presented to the Council by the then Minister of Education Eduardo Doryan. The legal framework of the Educational Policy towards the XXI century it is the Constitution of Costa Rica, the Fundamental Law of Education.
- **MICIT (Ministry of Science and Technology):** The Ministry has led the proposals issued in the "National Science and Technology: With the knowledge to Development" and especially in recent years has focused its activities in the development of Information Technology and Telecommunications as instruments of the transformation of society and economy of Costa Rica.
- **CONICIT (National Council for Scientific and Technological Research):** It is an autonomous institution of the Costa Rican government, technically specialized in the implementation of national policies and actions promoting financial management, information, assessment and advice. CONICIT is aimed at building capacities and synergies between stakeholders in the sector of science, technology and innovation.
- **MIDEPLAN (Ministry of Planning):** To guide national development and improve governance in the short, medium and long term, advising the President of the Republic in the making, developing strategic quality inputs, promoting and coordinating the national debate on National Planning System.
- **Ministry of Justice:** Costa Rican state body responsible for the prison terms, legal security of movable and immovable property of the inhabitants; comprehensive prevention of violence and crime, control of public spectacles they witness minors; promote a culture of peace through alternative dispute resolution, and constitute the legal representative of the Government of Costa Rica, as well as being a consultant for Public Administration.
- **Legislative Assembly:** Exercise the mandate from the people represented in the training process of law, constitutional rules and the adoption of international conventions and treaties, through discussion and participation of different civil society actors, as well as oversight of actions of the organs that make up the State.

Stakeholders

- **CAMTIC (Costa Rican Chamber of Information and Communication Technologies):** IT is a private, non-for-profit business association established in 1998. It was created in order to form a strategic block that would to allow strengthen and support the information and communication technologies (ICT) sector. Since CAMTIC begun its activities representing only the Costa Rican software sector (History), today it groups over 90% of the software national enterprises.
- **National Registry:** The National Registry of Costa Rica protects the rights registered, offers legal security and provides quality services with skilled human resources and appropriate technology.
- **PROCOMER (Foreing Trade Promotion Agency):** It is a public non-state, which is responsible for promoting Costa Rican exports; it has a special office to promote Information and Communication Technologies from Costa Rica.
- **FOD (Omar Dengo Foundation):** It is a private, nonprofit organization created in 1987. FOD runs national and regional projects in the field of human development, educational innovation and new technologies. His various projects have benefited more than one and a half million Costa Ricans, including children and young students, educators, professionals, people from communities and older adults.
- **Strategy XXI Century:** Strategy XXI Century was established in 2004 through a participatory process that has involved more than 200 professionals and leaders of the country's academic, entrepreneurial, institutional and political communities. The group's aims is to transcend different between governmental administrations differences, placing science and technology at the hub of the nation's development. From a long term approach, the Strategy orients and articulates the actions necessary for Costa Rica to reach its proposed goals in "The Half Century Plan in Science and Technology for Costa Rica". As of March 28th, 2008 Strategy XXI Century is private, independent and impartial, not-for-profit, apolitical and nongovernment association.
- **Crusa Foundation:** CRUSA is a private foundation, Costa Rica, independent, nonpartisan and nonprofit, which has two key strategic directions: support for projects under its four areas of concern (environment, education, science and technology and strategic capacity), and management and promotion of long-range initiatives, partnerships and support networks.
- **ProPyME Fund:** It is intended to finance actions and activities to promote and improve the management capacity and competitiveness of small and medium enterprises in Costa Rica, through technological development as a tool to contribute to economic development.
- **Banca para el desarrollo (Development Bank):** Its objective is to create a mechanism to finance and promote productive , viable and feasible (technically and economically) projects.
- **CONARE:** It regulates aspects of coordination for the joint exercise of university autonomy in various areas.

Universities

- **UCR (University of Costa Rica):** The University of Costa Rica is a state, independent and democratic institution of higher education, which promotes critical humanistic and cultural education, consisting of a community of students, teachers and professors, officials and administrators / as, which contributes transformations that society needs to achieve the common good, through the development of teaching activities, research and social action, supported by an institutional policy aimed at achieving social justice, equity, integral development, the full freedom and the complete independence of people.
- **The Technological Institute of Costa Rica (ITCR)** is a national autonomous university for higher education. ITCR is dedicated to teaching, research and extension of technology and related sciences for the development of Costa Rica. It was created by Law No. 4777 of June 10, 1971
- **UNA (National University):** The University is a public institution of higher education. It generates and develops knowledge with scientific and cultural importance to strategic national and international developing without distinction of gender, ethnicity, creed or social status.
- **INA (National Learning Institute):** It is an autonomous institution that provides training services and vocational training for people over 15 and legal persons, encouraging productive work in all sectors of the economy. It contributes to the improvement of living conditions and socio-economic development of the country.
- **CENFOTEC:** It is a private and independent institution of higher education, with academic, administrative and financial autonomy, whose primary purpose curriculum design and implementation of programs for training of professionals in information technology and communication.

3.2.5 Argentina

A significant part of research in Argentina is conducted by scientists in Argentina's public universities and public research institutes and laboratories (among them the Atomic Energy Commission (CNEA)³¹, the Administration for Health Laboratories and Institutes (ANLIS)³², the Institute of Agricultural Technology (INTA)³³, the Institute of Industrial Technology (INTI)³⁴; National Commission on Space Activities (CONAE)³⁵; and the Argentinean Nanotechnology Foundation (FAN)³⁶). Private companies and to a lesser degree private universities also sponsor and execute research activities.

The National Council for Scientific and Technological Research (CONICET)³⁷ was created in 1958 to promote and conduct research. CONICET played a key role in establishing research as a formal career in Argentina. Headed by a board composed

³¹ CNEA's official website: <http://www.cnea.gov.ar/>

³² ANLIS' official website: <http://www.anlis.gov.ar/>

³³ INTA's official website: <http://www.inta.org>

³⁴ INTI's official website: <http://www.inti.gov.ar/>

³⁵ CONAE's official website: <http://www.conae.gov.ar/>

³⁶ FAN's official website: <http://www.fan.org.ar>

³⁷ CONICET's official website: <http://www.conicet.gov.ar>

of public and private stakeholders in the Argentine ST&I system, CONICET executes policies and strategies formulated by MINCYT.

CONICET promotes and performs S&T activities at the national level in the different areas of expertise, based on the general policies set forth by the Government, and the priorities and guidelines established in the S&T National Plans. It is the leading entity in charge of the execution of RTD activities, together with National Universities.

There are roughly 1200 ICT researchers in Argentina, belonging to more than 40 research labs. Strong networks have been established with different European countries, particularly with Spain, France, Germany, Czech Republic, Finland, Portugal, the Netherlands and Sweden. There are also strong connections with other Latin American countries, particularly with Brazil, Uruguay and Chile.

According to Red Iberoamericana e Interamericana de Indicadores de Ciencia y Tecnología (RICYT)³⁸ recent report, Argentina has the highest researchers per thousand labour force ratio in Latin America, with a ratio of 2.47 for Full Time Equivalent researchers per thousand.

High-Performance Infrastructure Network

Innova-Red³⁹ is the National Research and Education Network of Argentina, a project of the Fundación Innova-T⁴⁰, the technology-transfer unit of CONICET. Its continuing mission is to provide to the education and research communities of Argentina state-of-the art technology in data transfer and assist them in any development they may profit from using advanced networking. It cooperates and coordinates actions with other academic networks in the country but it is the sole provider of advance network connectivity to other countries and regions. Under its current denomination InnovaRed began operations in December 2006 but its activities date back to 1990 and it connected to the Internet in March 1994.

In 2001, InnovaRed launched the Advanced Academic networks program fostering the use of advanced research networks throughout the country. Thus, it became a partner in the AmPath Project funded by National Science Foundation from United States and under the management of the Florida international University. In 2003, it was part of the CAESAR project⁴¹ funded by the European Commission to assess the possibility of forming and advanced academic network in Latin America. One year later, under the umbrella of the @lis program, InnovaRed became founding member of CLARA, the regional research and academia network.

In 2010 launched a bid to acquire 4,200km of dark fiber which is at this moment (March 2011) being bid in open tender. Currently InnovaRed connects directly to nine public universities and indirectly (through the network of national universities of Argentina) to the other 39. It also gives access to advanced Networking to 24 institutions throughout the country, including CONICET's institutes and regional centres, the INTA, the National Weather Service and the CNEA, to name the most relevant.

Argentina counts with relevant ICT stakeholders that are having an important role in fostering the sector. The most important ICT Argentinean stakeholders are listed

³⁸ RICYT's official website: <http://www.ricyt.org/>

³⁹ Innova-Red's official website: <http://www.innova-red.net/>

⁴⁰ Innova-T Foundation's official website: <http://www.innovat.org.ar/>

⁴¹ More information about the CAESAR project at <http://www.caesar-project.eu/>

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below divided in three tables (public sector, universities and research groups, and private sector):

Argentina counts with relevant ICT stakeholders that are having an important role in fostering the sector. The most important ICT Argentinean stakeholders are listed below (public sector, universities and research groups, and private sector):

Argentinian Policy Makers (public sector)

- ABEST: Argentine Bureau for Enhancing Cooperation with the European Community in Science, Technology and Innovation
- MINCyT: Ministry of Science, Technology and Productive Innovation
- ME: Ministry of Education
- Ministry of Science and Technology
- Ministry of Communications
- National Education and Research Network
- RELEX-AIDCO: DG External Relations. Strategic Engagement with Civil Society
- CNEA: Atomic Energy Commission
- COFECYT: Federal Council for Science and Technology
- CONAE: National Commission on Space Activities
- CONICET: National Council for Scientific and Technological Research
- FAN: Argentinean Nanotechnology Foundation
- Fundación AEI: Fundación Argentina en la Era de la Información
- IECyT: Instituto de Emprendimientos Científicos y Tecnológicos
- INTI: Institute of Industrial Technology (INTI)
- INCUBACEN: Technological Companies Incubators
- INCUEI: Incubadora de Empresas Innovadoras
- IFIR: Rosario Physics Institute
- INAUT: Automatics Institute
- Infotech: Infotech
- INTA: Institute of Agricultural Technology
- INTEC: Technological Development for Chemical Industry Institute
- INTECIN: Technology and Engineering Science Institute "Hilario Fernández Long"
- INTECNOR: Incubadora INNOVARED: Red Nacional de Investigación y Educación de Argentina
- de Empresas de Base Tecnológicas
- SECyT: Secretary for Science, Technology and Innovation of Production
- ANLIS: Administration for Health Laboratories and Institutes
- ANPCyT: National Agency for S&T Promotion
- ATICMA: Asociación De Tecnología De La Información Y Comunicación De Mar Del Plata

Universities leading ICT research

- Universidad de Buenos Aires
 - Engineering School
 - Exact and Natural Science School
- Universidad de La Plata
 - Software Engineering; MDD; Collaborative atmospheres and groupware; Web Engineering; Digital TV middlewares, etc
 - Open Source; Data Network, etc.
 - Intelligent Agents

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- Software Architecture, etc
- Simulation applied to health, intelligent factories, hydraulic resources, energy, etc
- Universidad de Córdoba
 - Computer Architecture Simulators and Digital Video Processing, etc
 - Computing Science
 - Artificial Intelligence
 - Software Design for tutorials, etc.
- Universidad Tecnológica Nacional
 - Ontological Engineering
 - Analysing supply chain
 - Distributed Simulation
 - Digital Images Intelligent Processing; Robotics; etc.
- Universidad Nacional del Sur
 - Communications; Digital Systems; Dynamics System; Control; Microelectronics, etc.
 - Knowledge Representation and Reasoning, Software Engineering; Graphics and Visualization
- Universidad Nacional de Luján
 - Data collection
 - Information system
- Universidad Nacional de Entre Ríos (UNER)
 - BIOENGINEERING SCHOOL
- Universidad Nacional del Litoral
 - ENGINEERING AND HYDRIC SCIENCE SCHOOL
- Universidad Nacional de Rosario
 - ENGINEERING SCHOOL
- Universidad Nacional de San Juan
 - Robótica and Manufacture System
 - Artificial Intelligent in Control, etc.
- Universidad Nacional de San Luis
 - Robotics Control Theory
 - Robótica; Modelling; etc.
 - Digital Electronics
 - Applied
- LIFIA: Computing Research and Formation Laboratory
- LINTI: ICT Research Laboratory
- GIDIS: Research and Development Software Engineering Group

Chambers and Associations (private sector)

- Asociación Argentina de Usuarios de la Informática y las Comunicaciones
- Asociación De Incubadoras De Empresas, Parques y Polos Tecnológicos (AIPyPT)
- Asociación De Tecnología De La Información Y Comunicación De Mar Del Plata
- Cámara Argentina de Comercio Electrónico
- Cámara Argentina de Consultoras de Ingeniería
- Cámara Argentina de Internet CABASE
- Cámara Argentina PyME
- Cámara de Empresas de Desarrollo Informático de Rafaela y la región
- Cámara de Empresas de Software y Servicios informáticos
- Cámara de Empresas Informáticas del Litoral
- Cámara de Industrias Informáticas, Electrónicas y de Comunicaciones del Centro de Argentina
- Cámara de Informática del Interior - Regional Cuyo
- Cámara de Informática y Comunicaciones de la República Argentina
- Cámara Infomática de Sunchales
- Cámara Sanjuanina de Empresas de Tecnologías de Información y Comunicación
- Comisión de Investigaciones Científicas de la Provincia de Buenos Aires
- Cluster Córdoba (CIC)
- Cluster de Empresas de Tecnologías de la Información de la Provincia Jujuy denominado ClusteAR
- Cluster Tecnológico
- Cluster TICs Rosario
- Cluster Tucumán Technology
- Confederación Argentina de la Mediana Empresa
- Distrito Informático del Gran La
- Emprendedores Argentinos Asociación Civil
- Fundación Argentina en la Era de la Información
- Incubadora de Emprendimientos Innovadores
- Incubadora de Empresas de Base Tecnológicas
- Incubadora de Empresas
- Instituto de Emprendimientos Científicos y Tecnológicos
- ISISTAN: Tandil Systems Institute
- Parque Científico Tecnológico
- Parque Tecnológico del Litoral Centro SAPEM
- Parque Tecnológico La Punta
- Parque Tecnológico Misiones
- Parque Tecnológico Tandil
- Polo de Tecnología Informática de Buenos Aires
- Polo IT Chaco
- Polo IT Corrientes
- Polo IT la Plata
- Polo Tecnológico Bahía Blanca
- Polo Tecnológico Constituyentes
- Polo Tecnológico Rosario
- Polo TIC Mendoza
- Sociedad Argentina de Informática e Investigación Operativa
- UBATEC S.A.

3.2.6 Brazil

ICT is among the priority areas for cooperation on science, technology and innovation and in that context Brazil and the EU agree to promote strategies for increasing participation by Brazilian researchers, universities, institutions and industries in FP7 RTD projects. The most important programmes related to R&D in the field of ICT are presented in the Table below. These programmes include the following ICT priorities:

- Open Source Software (OSS)
- Grid computing
- Digital cinema
- Digital TV
- Digital content distribution platforms
- Software development
- ICT applications and testbeds
- Videogame industry
- Health and medical applications
- Environmental and climate change

Also a number of universities are leading ICT research through various programmes and projects (University of São Paulo, University of Campinas, Universidade Federal do Rio de Janeiro, Universidade Federal de Pernambuco and Catholic University of Rio de Janeiro). Current research in ICT field is focused on:

- IPTV
- Advanced integrated electronic systems
- Software,
- Applications for health
- Computer Science
- Start-up incubator
- Digital TV
- Distance education
- Mobile telecommunications
- Environmental and climate change

In addition, in Brazil there is a large network of technological incubators associated to the National Association of Technological Parks (ANPROTEC), with hundreds of entities actively engaged in the promotion of ICT innovations. Software and ICT have been defined as national priorities in numerous funding calls in regional and local funding schemes that aim at these incubators and small companies.

Digital content production has been closely associated to technological innovation (for instance, content and services for digital TV, mobile transactions and contents as well as large repositories of digital assets and libraries, as seen for instance in the participation of Brazil in the World Library project. The RNP currently supports a working group on museums and digital libraries.

The Sao Paulo Public Radio and Television Broadcast (Fundação Padre Anchieta) is leading inroads into new media and is implementing a large scale digitalization program, while federal laws and sectorial funds perform a key role in subsidizing and supporting innovation in cinema, TV, distance education and online publishing via specific programs funded by the ministries of Culture, Education, Development and Industry. Moreover, the same priorities show up in State financing agencies, such as the National Social and Economic Development Bank (BNDES), which has during the last 5 years acted more prominently in the areas of innovation, with a

special emphasis on audiovisual production, informatics and other ICT-related innovations and applications.

It must be stressed that the Brazilian telecom, IT and broadcasting systems are still going through a restructuring stage after major changes in capital property structures, market share and strategic alliances of major European stakeholders (such as Telefónica and Portugal Telecom in the VIVO and Oi operations), stronger than ever public investments, regulatory conflict and industrial concerns (as the ever appreciating exchange rate puts the national economic and technological structure to a tough test of competitiveness, innovation and resilience).

There is still a high level of ad-hoc policies and uncertain implementations, digital inclusion initiatives sponsored by public agencies co-exist and more often than not loose speed and effectiveness as private entrepreneurialism gains momentum – for instance, despite several years of public policies focused on “telecenters” and “culture points”, there is still a very precarious broadband supply by the public sector (this became the major policy issue for the recently inaugurated Dilma Rousseff cabinet) while “lan houses” prosper and the base of the pyramid consumption of electro-electronics, from appliances such as TV and mobile phones to computers and ICT services (especially via triple-play packages), continue to rise. Skilled labor scarcity is probably the most pressing issue for the private sector.

The institutional sector associated to the private sector is thriving through a growing number of sectorial associations in the software, hardware and digital content areas, from chambers sponsored by the federal government such as SOFTEX to emerging clusters in the videogame and internet providers segments.

The most important ICT Brazilian stakeholders are listed below, offering a perspective about the results from dialogues and project submission at the national level⁴².

Brazil Policy Makers

- Ministry of Science and Technology
- Ministry of Science and Technology
- Ministry of Communications
- National Education and Research Network

Universities leading ICT research

- University of São Paulo
 - IPTV
- University of São Paulo
 - Advanced integrated electronic systems
- University of Campinas
 - Software, health, other applications
- Universidade Federal do Rio de Janeiro
 - Computer Science
- Universidade Federal de Pernambuco
 - Start-up incubator

⁴² A complete list of Brazilian strategic stakeholders is available at http://www.pro-ideal.eu/who_is_who_brazil)

- Catholic University of Rio de Janeiro

Brazil main enterprises

- Telefónica
- Portugal Telecom
- confICT
- Dilma Rousseff cabinet
- SOFTEX

3.2.7 Chile

The research and development of ICT in Chile are mainly located in four major cities: Santiago, Valparaíso, Viña del Mar and Concepción. This situation is explained by the fact that most of the Chilean population and private / public companies are also in the geographical area. Several attempts have been made to decentralize government the country, with little success so far.

Three regions (*Región metropolitana, Valparaíso* and *Bío-Bío*) concentrate 70% of total ICT researchers. There are also several regions with little or no ICT researchers. Therefore, it can be concluded that the geographical distribution of community ICT research is highly centralized in the regions mentioned.

There are 60⁴³ Universities in Chile, but only 24 universities and 2 research centres are involved in ICT Research. This number of universities represents the 40% of the Chilean institutions.

- Universidad Católica del Norte
- Universidad de la Concepción
- Universidad de Chile
- Universidad de la Frontera
- Universidad de la Serena
- Universidad del Bío Bío
- Universidad de Magallanes
- Universidad de Santiago de Chile
- Universidad de Talca
- Universidad de Valparaíso
- Universidad Diego Portales
- Universidad Nacional Andrés Bello
- Universidad Arturo Prat
- Universidad de Santiago de Chile
- Universidad de Tarapacá de Arica
- Universidad Tecnológico Metropolitana
- Universidad Técnica Federico Santa María

The main public institutions involved in the regulating ICT development are:

- **Ministry of Economics**⁴⁴. The goal set by the current President of Chile for this Ministry is "to raise the potential GDP of the country to reach development by 2018".

⁴³See: http://www.mineduc.cl/usuarios/sies/doc/201103101530560.instituciones_vigentes_m arzo_2011.xls

- **Undersecretary of Telecommunications**⁴⁵: Its mission is to promote equal access to ICT, through the granting of subsidies, concessions and permits; increase the competitiveness of the market, updating the sector's legislation and ensuring the appropriate protection of the users, supervising the telecommunication services.
- **Ministry of the General Secretary of the Presidency**⁴⁶. This Ministry is the support organization which coordinates and schedules the Government agenda. In particular, this Ministry is responsible for the Government's internal modernization programme.
- **Secretary of Digital Development from the Ministry of Economics**⁴⁷: This organization was created in February 2007 as a response to the need for designing and executing a public policy to promote the use of ICT by citizens, private companies and government organisations.
- **Chilean Economic Development Agency (CORFO)**⁴⁸: This Governmental organization promotes entrepreneurship and innovation through financing schemes and other activities.

The following organizations work in the promotion of ICT in the country, but they do not have regulatory authority:

- **Chilean Association of Companies in ICT**⁴⁹ (ACTI). This organization seeks to "promote the development and application of ICT, as well as the generation of internal and external markets for national ICT products and services, fostering free competition and the creation of legislation in order to form an adequate framework for the development of activities of the Technology Industry".
- **Digital Country Foundation**⁵⁰ (*Pais Digital*). This non-profit foundation aims at the research, dissemination, promotion and development of various aspects of technological sciences, in its broadest conception, with the objective of consolidating a digital culture in Chile.
- **Chile Foundation**⁵¹ (*Fundación Chile*). This foundation is a private, non-profit institution and its mission is to foster human and productive resources by developing and fostering high impact technological innovations and processes, technological transfer, and technology management.
- **Chilean Society for Software and Services**⁵² (GECHS). This organization includes around 70 ICT Chilean companies (mainly SME's) working on software development, outsourcing of IT solutions and ICT consulting. The main goal of GECHS is to promote and help improve ICT-based services.

⁴⁴ See: www.economia.cl

⁴⁵ See: www.subtel.cl

⁴⁶ See: www.minsempres.gob.cl

⁴⁷ See: www.estrategiadigital.gob.cl

⁴⁸ See: www.corfo.cl

⁴⁹ See: www.acti.cl

⁵⁰ See: www.paisdigital.org

⁵¹ See: www.fundacionchile.cl

⁵² See: www.gechs.cl

- **The Computer Law Association**⁵³: (*ADI-CHILE*) This is a non-profit organization founded in Santiago de Chile in March 2000. The goal of this entity is to promote and study the development of law sciences and their interaction with Information and Communications Technologies.

Regarding ICT private companies, there are over 160⁵⁴ operating in Chile. The best known are the following:

- **SONDA**: It is a Chilean multinational company head-quartered in Santiago, is one of the most important companies in sector of Information technology in Latin America. Founded in 1974 in association with Copec. The company is present in 9 countries: Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico, Peru and Uruguay.
- **ADEXUS**: Chile's Adexus is a privately held systems integrator and e-commerce solutions provider with operations in Peru, Ecuador and Chile as well as the US. The company offers services in the areas of information technology and communications, networking, and Internet. In addition it provides outsourced services, such as telemarketing, customer service, and help desk; computer platforms; and support for biotechnology. Adexus was founded in 1990 and is based in Santiago, Chile.
- **Grupo GTD**: It is a holding company for telecommunications providers with a focus on large and small and medium businesses (SME), government institutions and the residential sector. Grupo GTD products and services include dedicated voice links; data and video; local telephone; digital and IP telephony; Internet service; data center; storage and national and long distance; digital television; and residential telephone, television and Internet services.
- **ENTEL**: Entel Chile, a publicly listed telecommunications company, was formerly Chile's state-run long distance monopoly. In addition to national and international long distance, the company now provides broadband and dial-up Internet, mobile telephony and local telephony services. The company also has a call center and a data center. The company has operations established in Peru through its affiliates Americatel Peru and Servicios de Call Center del Peru.
- **MOVISTAR**: Movistar Chile, a subsidiary of Spanish Telefónica, is a publicly traded telecommunications provider. It offers local, long-distance and international services; data transmission; dedicated lines; broadband and wireless fidelity (Wi-Fi); terminal equipment sales and leasing; public telephone and other value-added services. In October 2009, the company brought all its communications services together, including mobile telephony, under the brand name of Movistar.
- **VTR**: VTR is a Chilean company that provides services of Internet broadband, TV by subscription and residential telephony through cable and VoIP protocol (Telephony IP). It separately commercializes his services through a Triple format Pack (Internet + telephony + TV by subscription). At the moment, the company is confirmed by a 80% pertaining to the Global Liberty (from the United States) through VTR GlobalCom and 20% to the

⁵³ See: www.adi.cl

⁵⁴ CONICYT, 2010, p. 15, See: <http://chiep.cl/index.php/es/documentos/documentos-de-analisis/finish/20/41>

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Corp Rec S.A.(Saieh Group Chile). It offers access to high speed Internet for residential and commercial places in Santiago and other 45 cities in Chile.

A complete list of ICT privates companies can be found in the report "Information and Communication Technologies in Chile Research areas and capabilities. State of the art report" wrote by CONICYT.

3.3 Potential for international cooperation in ICT – SWOT analysis

There exist an increasing potential for ICT R&D cooperation between Latin America and Europe. The FP7-ICT Work Programme represents a great opportunity for the scientific, technological and industrial communities of Latin America to participate as equal in international projects alongside great centres of excellence, universities and leading European and non-European innovative companies. The ICT Work Programme 2011-2012 reinforces the support to international cooperation activities, with three main objectives: (1) to jointly respond to major global technological challenges by developing interoperable solutions and standards, (2) to jointly develop ICT solutions to major global societal challenges, and (3) to improve scientific and technological cooperation for mutual benefit.

The first coordinated call EU-Brazil Research and Development cooperation open new opportunities for international cooperation in the ICT field. Similarly, Mexico and the EC are exploring ICT topics for future implementation of a coordinated call.

Moreover, the bilateral S&T agreements with the EC, i.e. Argentina, Brazil, Chile, and Mexico, have also increased the collaboration in programmes and activities of high mutual interest, including ICT. Also Colombia has reinforced the cooperation with the EU since the country's adoption of the European standard for digital terrestrial TV in 2008, and through the Joint Declaration signed by the European Commission DG Research and Colciencias in May 2010 establishing a structured S&T cooperation dialogue.

In addition, the Latin America countries involved in PRO-IDEAL PLUS have recently adopted research and ICT policies and strategies that are changing the face of the region and research cooperation with the European Union.

This emerging potential for cooperation in ICT is widely recognised by researchers, policy makers and stakeholders consulted during the project activities. Based on these findings, we have performed a SWOT analysis by country summarising the Strengths, Weaknesses, Opportunities and Threats for international cooperation in ICT.

In summary, we can say that the LA target countries have the following common ***strengths***:

- There are support mechanisms for development and technological innovation, technology transfer to industry in selected areas.
- ICT business associations, clusters and enterprises chambers well organized and with direct contact with government agencies.
- Wealth in biodiversity for the exchange of knowledge and technology to promote ICT.
- High human capital development in S&T.
- High quality Universities and increasingly number of PhDs in ICT with potential to international cooperation projects in wide research areas.
- Scientific excellence achieved by research groups in ICT.

Identification and Analysis of ICT research priorities

Mainly shared *weaknesses*:

- Lack synergies among the existing efforts to ICT (e.g. Universities and industry researchers, telecom, broadcasting and financial sectors).
- Shortage of ICT skilled human resources (i.e. the number of PhDs in ICT needs to reach international levels).
- Deficiency in R&D infrastructure; broadband limited and expensive, undergoing policy, regulatory and corporate conflicts.
- ICT business associations, clusters and enterprises chambers are mainly focused on decreasing of the digital gap, rather than R&D.
- Research is not aligned with the needs of the industry in ICT; it is necessary to identify cross-cutting areas for ICT companies.
- Lack of a complete map of the ICT R&D capacities in Countries.
- Lack of understanding of the rules to participate in EU R&D projects.
- Insufficient investment in ICT R&D.
- Weak intellectual property rights protection, which limits the possibility of accessing different sources of financing.

Essential common *opportunities*:

- FP7-ICT Work Programme is open to international cooperation in all research topics.
- Reinforcement of the ICT policy dialogue between EU and LA.
- Interest and support of the LA national governments to ICT cooperation with Europe.
- Increasing exchange of scientists and technologists among countries (sabbatical leaves, postdocs, double MSc and PhD diploma).
- Generation of R&D groups of multidisciplinary and culturally diversity.
- ICT development for the management of natural resources and biodiversity.
- Implementation of the ICT offer in R&D priorities, in order to further development of global competitiveness in LA countries.

Foremost mutual *threats*:

- End of FP7 and uncertainty of the new framework programme regarding international cooperation.
- Brain drain, as a result of international cooperation in research.
- Lack of policies for managing intellectual property rights, which can avoid cooperation with other countries.
- Gap between scientists and industry: perception that the scientific community only focuses on basic scientific research and do not have any interest in technological development and entrepreneurship activities.

3.3.1 Mexico

<p>Strengths</p> <ul style="list-style-type: none"> • Liaison offices with the EU to facilitate research cooperation (ICT-NCP, UEMEXCYT2 and FONCICYT). • Graduates from Europe that may become a catalyser as "ICT ambassadors" of Mexico in Europe. • Exchange schemes through sabbatical leaves and post-doctoral both in excellence universities and enterprises. • ICT business associations, clusters and enterprises chambers well organized and with direct contact with government agencies. • Recent Mexican's law created Technology transfer centers (CTT) for technological development. • ICT Network composed of about 250 members, mainly from the main research centres and universities. • Support mechanisms for technological innovation, like PROINNOVA or INOVATECH. 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Coverage of ICT-NCP, UEMEXCYT2, and FONCICYT is still limited. • Lack of a complete map of the ICT R&D capacities in Mexico. • ICT business associations, clusters and enterprises chambers are mainly focused on decreasing of the digital gap, rather than R&D. • The number of PhDs in ICT needs to reach international levels. • Little mobility of researchers to industry. • Lack synergies among the existing efforts to ICT. • National Digital Agenda (ADN) does not include R&D in ICT. • Limited use of ICT networks and research laboratories for scientific and technological exchange. • ICT R&D activities are mainly realised in the central region of Mexico.
<p>Opportunities</p> <ul style="list-style-type: none"> • Increasing exchange of scientists and technologists among countries • Bilateral programs with European countries could increase the possibilities of cooperation in FP7-ICT programs. • Reinforcement of FP7 training programs to facilitate their participation. • Generation of R&D groups of multidisciplinary and culturally diversity. • New graduated PhDs could address issues in companies through specific programs enterprise-university. • Integral plans of research in universities for undergraduate involvement. • ICT network should be strengthened through activities with all stakeholders in enterprises, government and universities. • Encouraging the use of remote laboratories worldwide for collaboration with EU entities. 	<p>Threats</p> <ul style="list-style-type: none"> • Limited resources to operate in practice a single instance (i.e. ICT-NCP) with a stretch presence with key institutions: to identify best practices. • Development of collaborative programs between the EU and Mexico may take longer due to the end of FP7. • Gap between scientists and industry: perception that the scientific community only focuses on basic scientific research and do not have any interest in technological development and entrepreneurship activities. • An integral research plan may take time to be part of universities daily activities. • The industry does not know the perspective of national interests in research. • To have the capacity to generate high added value projects in R&D.

3.3.2 Colombia

<p>Strengths</p> <ul style="list-style-type: none"> • Wealth in biodiversity for the exchange of knowledge and technology to promote ICT. • Creation of living labs integrating research and innovation processes. • Academic accredited university, national success of international cooperation projects in various areas that certify the quality of students. • Government support to financing of students abroad, ensuring that the recipients return to the country to repay part of its support. • Capacity for collaboration and research in smart cities, given the wide diversity of climates and cultures. 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Deficiency in R&D infrastructure, making the country less attractive to international cooperation projects. • Cultural barriers to the adoption of ICT by Colombian citizens. Lack of education in ICT to create ICT culture from the beginning of the educational process. • Lack of policies to support young researchers in ICT. • Research is not aligned with the needs of the industry in ICT, identifying cross-cutting areas for ICT companies is required. • Lack of an inventory of resources and capabilities in the area of ICT makes it more difficult international cooperation in ICT.
<p>Opportunities</p> <ul style="list-style-type: none"> • Plan TIC Colombia, which promotes the use of ICT in the country. • Networking participation to spread the skills and interests of institutions to international agreements in ICT and bilateral exchange of knowledge. • Development of the entire chain of intelligent management of information (from data collection to analysis). • ICT development for the management of natural resources and biodiversity Implementation of the ICT offer in R&D priorities, in order to further development of global competitiveness in the country. 	<p>Threats</p> <ul style="list-style-type: none"> • Brain drain, as a result of international cooperation in research. • Bring to the country experts in ICT companies that don't share their knowledge. • Lack of policies for managing intellectual property rights, which can avoid cooperation with other countries.

3.3.3 Cuba

<p>Strengths</p> <ul style="list-style-type: none"> • Strategy for ICT R&D well defined. • High human capital development • ICT-NCP to promote international cooperation in ICT R&D. • Development in areas of health, biotechnology and education. • Defined government policy for use of open source software platform 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Lack of understanding of the rules to participate in EU R&D projects • Difficult access to potential consortiums and international partners. • High costs of telecommunications with Cuba. • Lack of infrastructure for Internet connection that meet the international standards.
<p>Opportunities</p> <ul style="list-style-type: none"> • Joint Declaration between EU and Cuba, in the S&T sector, since 2008 • Interest and support of the government to ICT cooperation with Europe • FP7 ICT Programme, Interest to increase scientific and technological cooperation in ICT • Current cooperation in FP7 projects in ICT and eInfrastructures open new opportunities for researchers and companies • Regional initiatives for EU-LA cooperation: Alfa, Euroclima, al-Invest, Eurosocial, Biological corridor of the Caribbean with Dominican Republic and Haiti, ERASMUS MUNDUS • University exchange: bilateral/EU 	<p>Threats</p> <ul style="list-style-type: none"> • U.S. embargo of Cuba. • Brain drain, as a result of international cooperation in research. • Intellectual Property Rights loss. • Slow adaptation of Cuba society and economy to a more and more global environment

3.3.4 Costa Rica

<p>Strengths</p> <ul style="list-style-type: none"> • Specialized educational platform playing an important role in the competitiveness of digital technologies. • Productive Sector with more than 800 private companies in the ICT sector. • Program on market innovation involving 200 Costa Rican companies' managers. 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Shortage of ICT skilled human resources. • Underutilized technical training platform: Costa Rica has enormous potential to improve the coverage and diversity in technical training. • Insufficient investment in ICT R&D. • Little linkage between business, university and government. • Weak telecommunications network platform, especially in rural areas • Weak intellectual property rights protection, which limits the possibility of accessing different sources of financing. • Complex and bureaucratic procedures in the allocation of funds to R&D. • Failure to link different initiatives, programs and projects related to ICT.
<p>Opportunities</p> <ul style="list-style-type: none"> • Country Brand: Costa Rica is associated to the development of national technology companies. • National Telecommunications Plan: industry promotion and consolidation of a national platform for telecom networks. • Digital Government Plan: Inventory of resources and capabilities, establishing a planning and prioritization of resources. • Strategy XXI Century proposing major objectives to follow, reaching levels of maturity in science and technology. • Costa Rica Green and Smart 2.0 to consolidate an internationally competitive and sustainable digital business ecosystem, for digital sector development in the country. • Costa Rica country's size allows for greater ICT dialogue between stakeholders and institutions. • "Fondo de Incentivos" for potential research projects in ICT. • The European Union cooperation through financial resources and people transferring knowledge and technology. • Project Angels Network strengthening networks of cooperation and transfer of knowledge and technology. • Joint research with other countries 	<p>Threats</p> <ul style="list-style-type: none"> • Strong competence of China and India in ICT world markets • Lack of agreements with the EU at regional level. • Reduced foreign investment in Costa Rica that may cause a decline in investment in research and development • Low interconnectivity of public institutions. • Limited access to Internet, causing a loss of competitiveness.

3.3.5 Argentina

Excerpted from the White Paper on ICT Foresight - Project 2020 (2009), Ministry of Science, Technology and Productive Innovation (MINCyT), Argentina (p. 222)⁵⁵

<p>Strengths</p> <ul style="list-style-type: none"> • Decision to design a policy targeted to promote science, technology and innovation to build a "knowledge-based society." • Decision to implement a policy to improve telecommunications nationwide. • Decision to implement a federal policy to restore and enhance public school in order to reduce the digital, educational and social gaps, throughout Argentina. • Scientific excellence achieved by some research groups. • Developments and transfers to industry in selected areas. • Training of highly qualified human resources. 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Few ICT research groups having high scientific level. • The number of trained human resources is insufficient to maintain the pace of growth that the ICT sector has experienced in the country. • Lack of innovative results in the incorporation of ICT by industries in general (weak links in the ICT sector with the productive chains). • Many large industrial companies that incorporate innovative results are subsidiaries of multinational technology decision centers abroad and do not carry out local technology developments. • Lack of national strategies to promote a better use of ICT, especially in vertical markets that are not sufficiently explored. • Lack of strategies to achieve national associations of research groups with software development companies • Gap among research groups in ICT and software development companies. • Few software development companies oriented to developing high-added value products or services
<p>Opportunities</p> <ul style="list-style-type: none"> • Global trend to support technological innovation. • Local research groups connected with international research groups of high scientific level. • Highly qualified Argentinean researchers living abroad. • Unmet needs in the world in some areas such as clean technologies, energy efficiency, solutions for senior citizens, independent living solutions, solutions for continuing education, solutions for participatory citizenship, etc. • Unexpected convergences in the development of ICT in many technological trajectories developed separately (interrelationships that are constantly alternating and transforming). 	<p>Threats</p> <ul style="list-style-type: none"> • Established networks in other regions are coming to compete in the Latin American market. • A macro-economic global crisis. • Emigration of young professionals, either abroad or to other areas of knowledge owing to lack of opportunities.

⁵⁵ http://www.mincyt.gov.ar/multimedia/archivo/archivos/Libro_Prospectiva_TIC_2020.pdf

3.3.6 Brazil

<p>Strengths</p> <ul style="list-style-type: none"> • Academia counts with an increasingly number of PhDs in ICT. • Active research on ICT access, use and dissemination led by the Internet Steering Committee (CETIC.br) for companies, schools, households and "land-houses". • Pro-Active and historical record of engagement with European universities, companies and diplomacy. • European industry presence in audiovisual culture such as cinema, erudite music, literature and medicine. • ICT business associations, clusters and enterprises chambers well organized and with direct contact with government agencies. • National Social and Economic Development Bank (BNDES) long term funding policies for innovation, telecom, broadcasting (digital TV) and other ICT-related investment projects. 	<p>Weaknesses:</p> <ul style="list-style-type: none"> • Concentration of ICT for S&T uses in the Southern regions. • Broadband limited and expensive, undergoing policy, regulatory and corporate conflicts. • Academia and enterprises do not know all the opportunities for ICT collaboration with EU. • ICT business associations, clusters and enterprises chambers are mainly focused on sectorial lobbying, rather than R&D. • The number of PhDs in ICT needs to reach international levels. • Little mobility of researchers into industry and applications. • Lack of integration of the existing efforts to ICT, gaps among telecom, broadcasting and financial sectors. • New wave of innovations (web 3.0, semantic Web, Internet of Things, new electronic media and entertainment) are yet sub-represented in university and policy agendas. • High costs of entrepreneurship make more difficult to bridge the gaps between R&D and companies/markets.
<p>Opportunities</p> <ul style="list-style-type: none"> • Advanced and widespread diplomatic and institutional network of cooperation agencies in the field of S&T, with specific funding for Pan-European as well as individual country-based funding for R&D • The upcoming international megaevents linked to soccer and Olympic sports create ICT investment opportunities. • Increasing exchange of scientists and technologists among countries (sabbatical leaves, postdocs, double MSc and PhD diploma). • Emerging "base of the pyramid" consumers and growingly prosumers will significantly expand the markets for ICT. • Lack of regulatory stability also means new fields and markets are still open to innovative and entrepreneurial spirits. • Generation of R&D multidisciplinary groups benefits with cultural diversity. • Incubators, accelerators and other institutional infrastructures are expanding with good connections to major public and private universities and foundations in different areas of Brazil. • Major global producers (such as China) are negotiating major plant installation projects in Brazil to cover Latin American, African and even North American markets. 	<p>Threats</p> <ul style="list-style-type: none"> • The number of researchers doing post-doctoral or sabbaticals abroad and not returning to Brazil is alarming. • Development of collaborative programs between the EU and Brazil has advanced institutionally, but with limited practical impact or representativeness. • Increasing gap between the scientific community and the industry • The industry still profits from appreciation of national currency as translated in higher imports of parts, components and technology, downplaying the role of local universities and suppliers.

3.3.7 Chile

<p>Strengths</p> <ul style="list-style-type: none"> • National programs and global service centers to attract investment in ICT R&D. • Existence of prestigious researchers in the areas of ICT, as well as a good level of publications. • Encourage certification of ICT companies. • Good national ICT infrastructure which increases the competitiveness of the national ICT industry. • Access to cutting-edge technology (open economy). • Application of ICT to develop innovative solutions in industries where the country has competitive advantages. 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Deficit of skilled workforce • Low level of quality certification of local ICT companies and poor adherence to standards. • The ICT companies have finance problems and investment market venture capital is poor. • Important gaps in technical and professional training in ICT. • Lack of collaboration and technology transfer between universities, technological institutes and companies. • Small ICT local market • Insufficient internationalisation culture among national companies.
<p>Opportunities</p> <ul style="list-style-type: none"> • Chilean economic and political conditions are in favour of development of the ICT industry. • The Digital Agenda can become the engine of development of ICT for government and economy. • ICT starts playing a role in supporting business strategies. • Free trade agreements and develop technology trade. • Increasing the interchange of researchers from Chile to Europe and vice-versa. • Government support and promotion to the installation of ICT R&D Centres and global companies in Chile. 	<p>Threats</p> <ul style="list-style-type: none"> • Insufficient international software patents (not only by copyright), causing difficulties to enter to other markets. • Trend to outsource Business Processes (Offshore) to foreign companies with experience, instead of choosing and developing ICT domestic companies. • Risk of market concentration in few global players. • Not enough programs for funding the development of the ICT industry.

4 ICT R&D PRIORITIES FOR COOPERATION WITH EUROPE

4.1 ICT research areas: from quantitative results to qualitative results

The PRO-IDEAL PLUS survey is a first step to identify common ICT R&D priorities to enhance cooperation between Latin America and Europe, their long-term perspective and alignment with the EU research priorities in ICT. Countries in the PRO-IDEAL PLUS consortium have a great potential for ICT research cooperation practically across the eight ICT Work Programme Challenges⁵⁶. The outputs of the survey, as a **quantitative basis**, will serve as a foundation for building a Roadmap on ICT research cooperation between Europe and Latin America.

Complementary, the first set of Round Tables with selected stakeholders served not only to strengthen the ICT dialogue and support the national policies co-ordination on international R&D co-operation in the ICT sector, but also to further identify and validate the ICT research priorities in LA target countries.

Thus, the ICT R&D priority areas, identified in the survey as a first step, were refined and complemented, as a second step, with national ICT priorities already defined in some countries by the institutions responsible for R&D policies (e.g. Mexico, Argentina, Colombia), and throughout discussions with key stakeholders and decision makers, such as FP7-ICT NCPs, institutions in charge of implementing the S&T Agreement and ICT key players, during the first set of Round Tables. The active discussions in each country allowed a **common view** of these ICT R&D priority areas and as a **qualitative basis**.

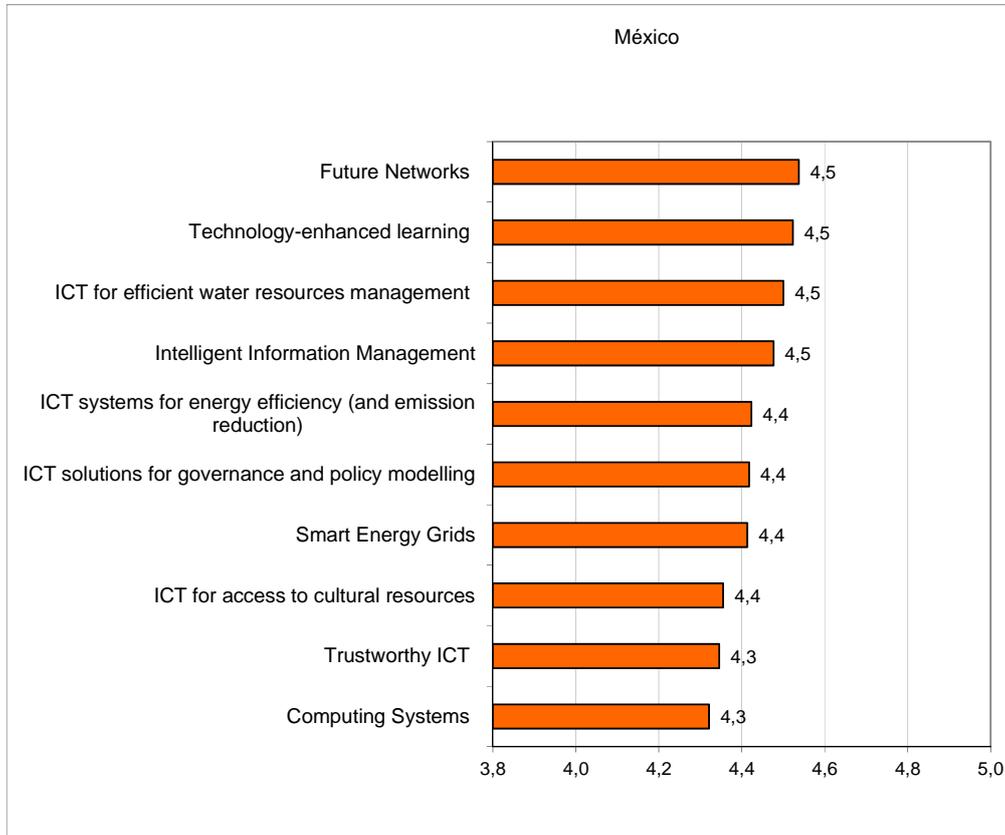
In summary, Round Tables confirmed the pertinence of some important key priority areas in each country, e.g. Intelligent Information Management, Computing systems and Technology-enhanced learning, among others. They also brought back some other priority areas to the spotlight, e.g. Cloud Computing, smart components and smart systems integration, and Manufacturing solutions for new ICT products, among others.

It is important to note that for each country a top five national key priority areas was created, and with those results it was also possible to establish a new top ten Latin American key priority areas related to ICT research, as shown at the end of this chapter.

⁵⁶ EC, ICT Work Programme 2011-12 Agreed by ICT Programme Committee
<http://cordis.europa.eu/fp7/ict/>

4.1.1 Mexico

Following the PRO-IDEAL PLUS survey findings, and ordered according to their importance in the country, the top 10 Research priorities in Mexico are:



Furthermore, the Great Challenges (GC), presented by the National Thematic Network in ICT (RED-TIC CONACYT) that can make significant progress in research and innovation in ICT, are shown below:

- GC1) Relevant information for decision making
- GC2) ICT for biomedicine: National Health Improvement
- GC3) ICT and education in the XXI century
- GC4) Security and transparency of information and services
- GC5) Intelligent Environments for problems of large cities
- GC6) Knowledge-based services for citizens

The above priorities have been discussed in the Round Table held in Mexico on May 24th of 2011. The following are the result of the vision of the participants in the discussion:

- Cloud Computing; Internet of Services.
- Safety and healthcare record information reuse.
- New paradigms for embedded systems, monitoring and control towards complex systems engineering.
- Knowledge-based services for citizens (Point GC6, not in the survey).

The outcomes of the Round Table in Mexico have validated three priorities (highlighted in yellow in the following table) of the PI+ survey national top 10. Two more (highlighted in grey) were added to the list, due not only to their importance

Identification and Analysis of ICT research priorities

in the national ICT policies and strategies, but also to the actual national capacities in terms of talent and infrastructure. Combining the findings of the PI+ survey and the Round Tables, the new top 5 national ICT priorities list is shown below:

Challenge No. (related to Work Programme FP7 ICT)	Objective
1	Future Networks
1	Cloud Computing, Internet of Services and Advanced Software Engineering
3	New paradigms for embedded systems, monitoring and control towards complex systems engineering
3	Computing Systems
4	Intelligent Information Management

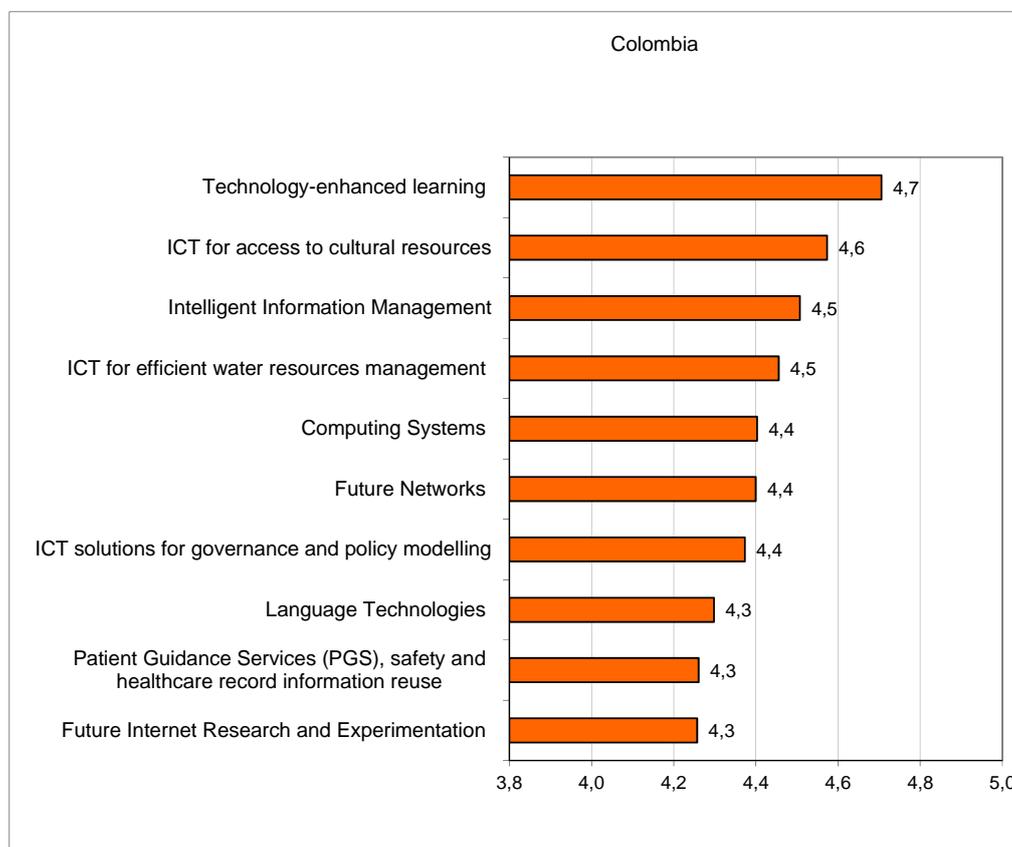


National Top 10 Priorities of the PI+ Survey, validated by the attendees in the Round Table
New top priorities added by attendees in the Round Table

As shown in the summary table of priorities above, the most frequently mentioned Challenges are CH1: "Pervasive and Trusted Network and Service Infrastructures and number" and CH3 "Alternative Paths to Components and Systems". We can infer that these are critical issues to national development, and provide an excellent opportunity for cooperation between Mexico and the European Union.

4.1.2 Colombia

The following graphic shows the top 10 ICT research national priorities, according to the PI+ survey:



In the first Round Table in Colombia held in June 2011, the participants selected the following priorities:

- ICT for access to cultural resources: Including anthropological research, in order to give a better direction to the ICT policies.
- Future internet research and experimentation: Including audio visual content, as there is no R&D related to complementary aspects of development in this topic.
- Future networks: By improving access to networks. There is a failure to prioritize aspects of physical infrastructure.
- ICT for efficient water resources management: ICT for the use and protection of natural resources
- Technology-enhanced learning: In particular ICT aimed at increasing the competitiveness of MSME using new tools enhanced by ICT
- Intelligent information management, including data management, intelligent information management and business intelligence.
- ICT for governance and policy modelling.
- Patient guidance service (PGS), safety and healthcare record information reuse

Thus, the outcomes of the Round Table in Colombia have validated five priorities (highlighted in yellow in the table below) aligned with the results of the PI+ survey.

Identification and Analysis of ICT research priorities

The new top 5 national priorities for international cooperation in ICT are shown below:

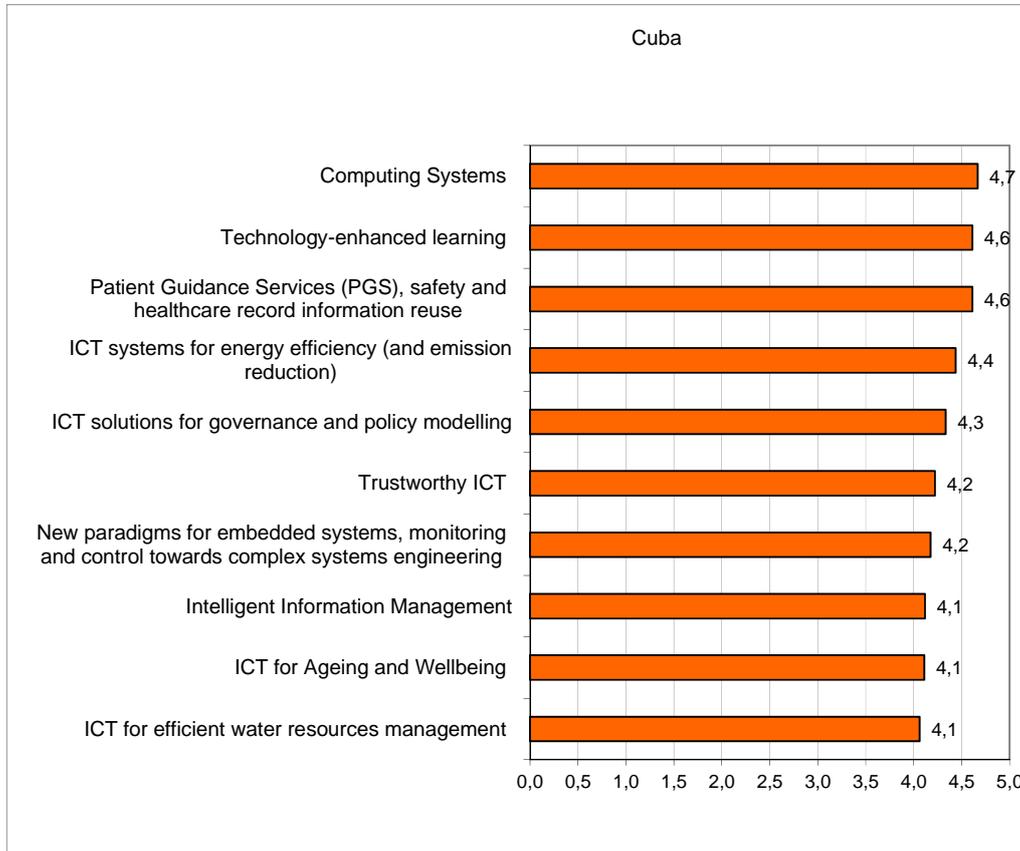
Challenge No. (related to Work ProgrammeFP7 ICT)	Objective
1	Future Networks
4	Intelligent information management
5	ICT for governance and policy modelling
6	ICT for efficient water resources management
8	Technology-enhanced learning



National Top 10 Priorities of the PI+ Survey, validated by the attendees in the Round Table
New top priorities added by attendees in the Round Table

4.1.3 Cuba

Following the PI+ survey, and ordered according to their importance in Cuba, the top 10 ICT research priorities are:



According to the results obtained in the Round Table held in Cuba, in June 14th 2011, the following are the outcomes on the discussion of the top national priorities:

- Computing Systems, specially the development and use of open source applications (Free Software, Open Source), Basic Software, Bioinformatics and e-Infrastructure.
- Very advanced nanoelectronic components.
- Smart components and smart systems integration, including Biotechnology
- e-health and Patient Guidance Services (PGS), safety and healthcare record information reuse.
- ICT solutions for governance and policy modelling, including e-governance and geographic information systems for disaster prevention.
- Technology-enhanced learning, especially in applied research, digital media, Cubans content, and knowledge networks.

Therefore the outcomes of the Round Table in Cuba have validated three priorities (highlighted in yellow in the table below) of the PI+ survey national top 10. One more (highlighted in grey) was added to the list, due to its importance in the national development. Combining the findings of the PI+ survey and the Round Tables, the new top 5 national ICT priorities list is shown below:

Identification and Analysis of ICT research priorities

Challenge No. (related to Work FP7 ICT Programme)	Objective
3	Computing Systems
3	Smart components and smart systems integration
5	Patient Guidance Services (PGS), safety and healthcare record information reuse
5	ICT solutions for governance and policy modelling
8	Technology-enhanced learning

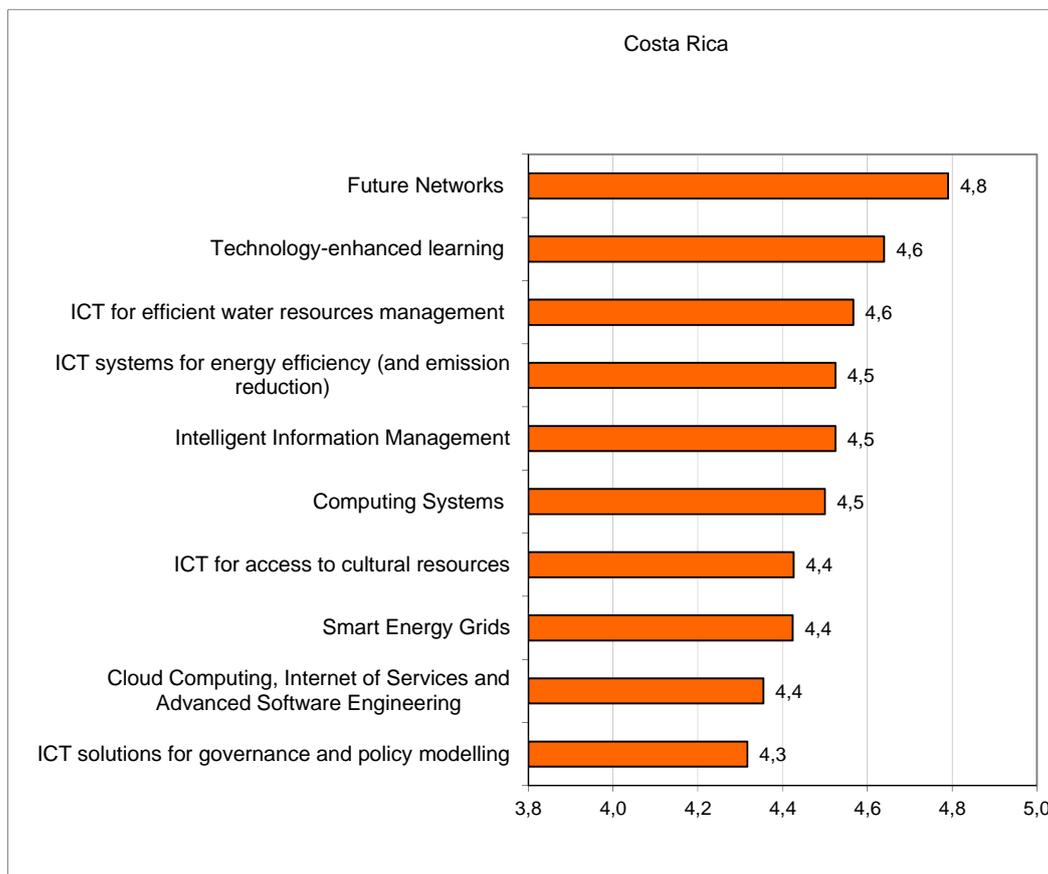


National Top 10 Priorities of the PI+ Survey, validated by the attendees in the Round Table
 New top priorities added by attendees in the Round Table

As shown in the summary table of priorities above, the most frequently Challenges mentioned are CH3 "Alternative Paths to Components and Systems", and CH5 "ICT for Health, Ageing Well, Inclusion and Governance".

4.1.4 Costa Rica

Ordered according to their importance in the country, the graphic below shows the top 10 ICT research priorities in Costa Rica, as a result of the PI+ survey.



According to the results obtained by the attendees of the Round Table held in Costa Rica, in June 15th 2011, the following are the outcomes of the top national priorities discussion:

- Intelligent information management
- ICT systems for energy efficiency
- Future Networks
- ICT for access to cultural resources
- ICT solutions for governance and policy modelling
- Cloud computing, Internet of Services and Advanced Software Engineering
- ICT manufacturing and enterprise solutions
- Technology-enhanced learning
- ICT for access to cultural resources

These outcomes validated five priorities (highlighted in yellow below) of the PI+ survey national top 10, which are essential to the national development, and thus represent a great opportunity for international cooperation between Costa Rica and the European Union.

Identification and Analysis of ICT research priorities

Challenge No. (related to Work Programme 2011 - EU)	Objective
1	Future Networks
2	ICT systems for energy efficiency
4	Intelligent information management
5	ICT solutions for governance and policy modelling
8	ICT for access to cultural resources

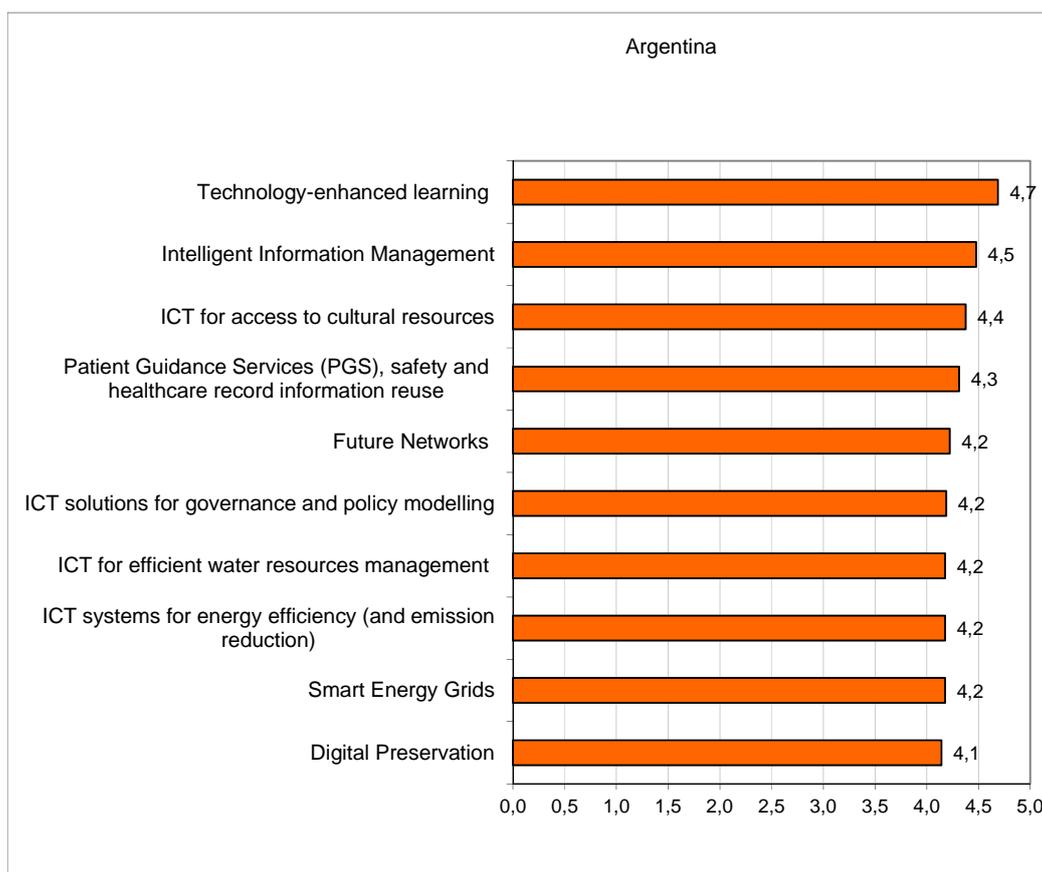


National Top 10 Priorities of the PI+ Survey, validated by the attendees in the Round Table

New top priorities added by attendees in the Round Table

4.1.5 Argentina

The following graphic shows the results of Argentina in the PI+ survey. Ordered according to their importance in the country, the top 10 ICT research priorities in Argentina are shown below:



In June 2009, MINCYT declared ICT research as one of the national priorities in order to strengthen the country's innovation profile. An advisory board on ICT priorities produced the "White Paper ICT Prospective. Project 2020"⁵⁷ containing the identification of ICT challenges and the ICT R&D priorities for Argentina for the next ten years. The white paper states that one of the main challenges of Argentina, in terms of science and technology, is to transform the ICT production from a linear paradigm to a non-linear one based on development and innovation.

As a result, the five main ICT research priority areas are shown below:

⁵⁷ MINCYT, Argentina, 2009. Libro blanco de la prospectiva TIC Proyecto 2020. [http://www.mincyt.gob.ar/multimedia/archivo/archivos/Libro Prospectiva TIC 2020.pdf](http://www.mincyt.gob.ar/multimedia/archivo/archivos/Libro_Prospectiva_TIC_2020.pdf)

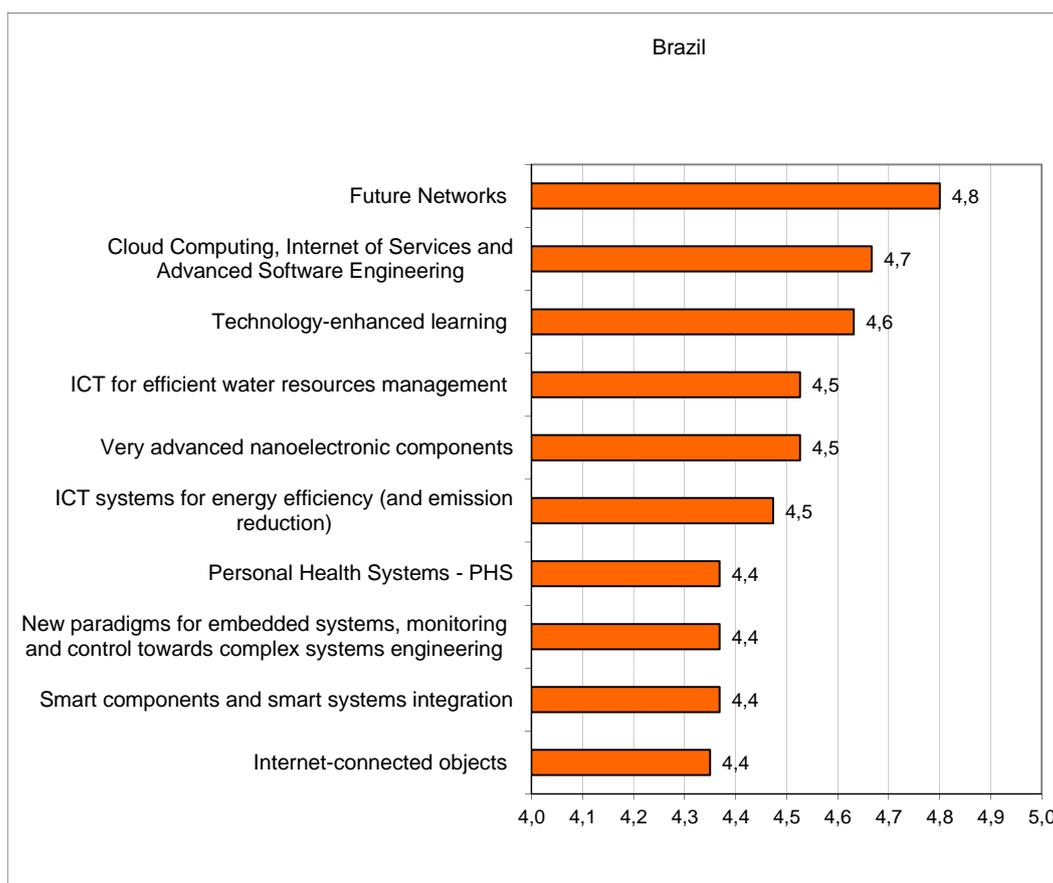
Challenge No. (related to Work Programme 2011 - EU)	Objective
7	Technologies for high-value-added IT services (Manufacturing solutions for new ICT products)
6	ICT for Agriculture and Agribusiness (ICT for efficient water resources Management)
4	New Media Technologies (Intelligent Information Management)
3	Modelling and Simulation Technologies (Smart components and smart systems integration)
3	Bioinformatics (Computing Systems)



National Top 10 Priorities of the PI+ Survey, validated by the National authorities
 New top priorities added by National authorities

4.1.6 Brazil

Following the PI+ survey, the top 10 ICT research priorities in Brazil are:



Nevertheless, it is remarkable that Brazil and the European Commission launched in 2010 a coordinated call for proposals⁵⁸. The initiative is likely to step up cooperation

⁵⁸ ICT EU-Brazil Coordinated call
http://cordis.europa.eu/fp7/dc/index.cfm?fuseaction=usersite.FP7DetailsCallPage&call_id=377

Identification and Analysis of ICT research priorities

on research and development in ICT, which will allow researchers and industries in the EU and Brazil to exchange their R&D strengths in key technological areas such as:

- Microelectronics and micro-systems,
- Networked monitoring and control
- Future Internet - experimental facilities
- Future Internet - security,
- e-Infrastructures.

Furthermore, the Blue Book⁵⁹ is also keen on recommendations for ICT policies and strategies.

In summary, the table below shows the priority areas that can enforce the cooperation on ICT research and innovation between Brazil and the EU, and increase the participation of Brazilian researchers, universities, institutions and industries in FP7-ICT projects.

Challenge No. (related to Work Programme 2011 - EU)	Objective
1	Grid computing (Cloud Computing, Internet of Services and Advanced Software Engineering)
3	Open Source Software, OSS, testbeds (Computing systems)
4	Digital cinema, Digital TV, Digital content distribution platforms, Software development (Intelligent Information Management)
5	Health and medical applications (ICT for Ageing and Wellbeing)
6	Environmental and climate change (ICT for efficient water resources Management)



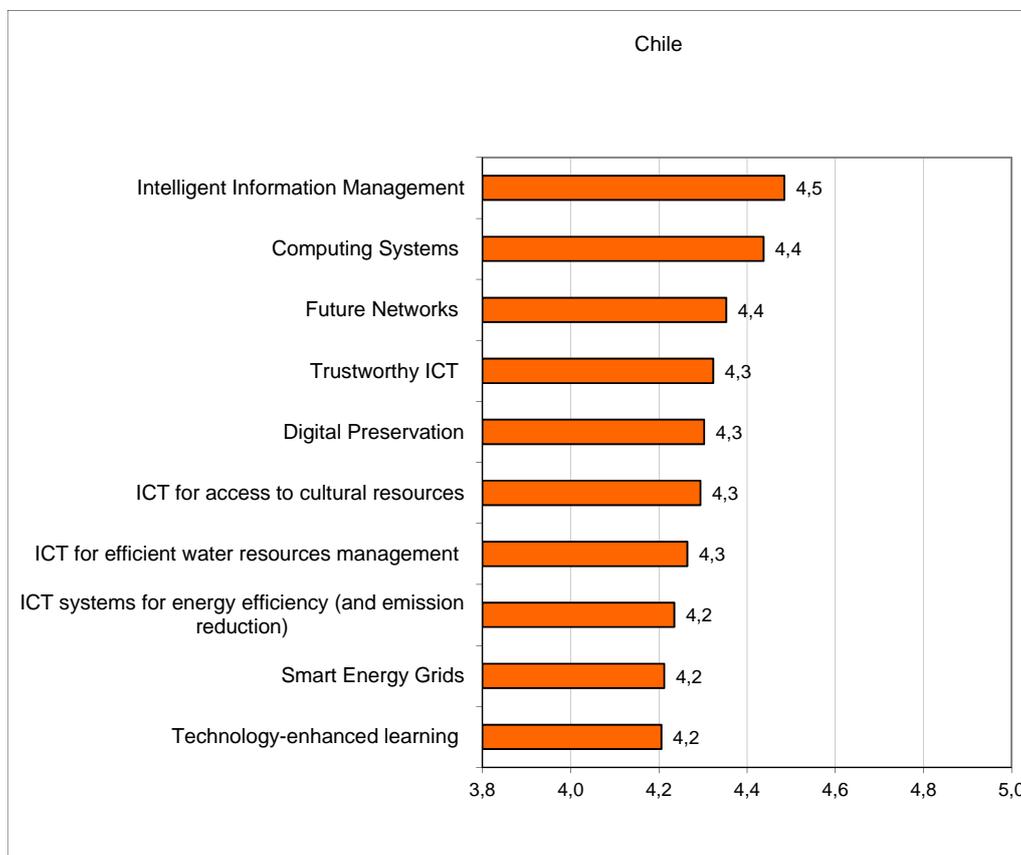
National Top 10 Priorities of the PI+ Survey, validated by the National authorities

New top priorities added by National authorities

⁵⁹ LIVRO AZUL - 4ª Conferência Nacional de Ciência Tecnologia e Inovação para o Desenvolvimento Sustentável, at <http://www.cgge.org.br/publicacoes/livroazul.php>

4.1.7 Chile

Following the PI+ survey, the top 10 ICT research priorities in Chile are:



According to "Analytical report on Science and Technology cooperation between the EU, its Member States and Chile⁶⁰" wrote by CONICYT, the research topics that are the priority to the Chilean Government in the context of the specific areas of FP7 are:

- ICT Information and Communication Technology,
- ICT for mobility, software development and,
- ICT for SMEs.
- Although there is not a priority, the importance of open source was also highlighted.

On the other side, the Chilean government has recently developed a plan to make of Chile a digital nation. A consortium of government agencies, academic institutions and companies of the private sector was formed to discuss a vision for Chile. A Digital Program was introduced in February 2010 with a plan a total of 34 initiatives across 6 areas of action, including:

- access,
- eGovernment,
- education and training,

⁶⁰ CONICYT, "Analytical report on Science and Technology cooperation between the EU, its Member States and Chile", p. 17, See: <http://chiep.cl/index.php/es/documentos/documentos-de-analisis/finish/20/45>

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- ICT industries,
- companies and
- legal and regulatory frame.

In summary, 4 out of the top 5 priorities were already identified in the PI+ survey, and ICT solutions for eGovernment has been also considered among the five priorities for ICT research.

Challenge No. (related to Work Programme 2011 - EU)	Objective
1	legal and regulatory frame (Trustworthy ICT)
4	ICT industries (Digital Preservation)
4	Virtual Access (Intelligent Information Management)
5	eGovernment (ICT solutions for governance and policy modelling)
8	Education and training (Technology-enhanced learning)



National Top 10 Priorities of the PI+ Survey, validated by the National authorities

New top priorities added by National authorities

4.2 Consolidated Top ten ICT R&D priority areas for cooperation with the EU

The process for selecting the top five priorities consists of two main steps. The first step was to put in place the PRO-IDEAL PLUS survey to identify ICT R&D national priority areas. Among 1.590 ICT researchers and stakeholders from Mexico, Colombia, Costa Rica, Cuba, Argentina, Brazil, Chile and Uruguay were invited to respond the survey. This quantitative research was conducted online via web-based survey using Google Docs online forms. Overall, 356 **individual responses** belong to Universities and research centres (56%), the industry (32%) and Government institutions and associations (12%). This **quantitative survey** report outlines the top ten Latin-American ICT R&D priorities:

- 1) Technology-enhanced learning
- 2) Future Networks
- 3) Intelligent Information Management
- 4) ICT for efficient water resources management
- 5) Computing Systems
- 6) ICT for access to cultural resources
- 7) ICT for Energy Efficiency Systems
- 8) ICT solutions for governance and policy modelling
- 9) Smart Energy Grids
- 10) Patient Guidance Services (PGS), safety record and healthcare information reuse

The second step was to match the ICT R&D priority areas through a set of Round Tables with selected stakeholders from LA target countries and the EU in order to get a **qualitative assessment** the priority areas in terms of:

- National policies on S&T,
- Co-operation in the ICT sector,
- ICT policies and research priorities,
- Their alignment with the priorities of the EU.

As a result, the ICT R&D priority areas from the survey were validated, refined and complemented. The active discussion in each country Round Table gave to participants a **general common view** of these ICT R&D priority areas.

The following table provides an insight of the current ICT research priorities in Latin America target countries. It summarises the results of the ICT R&D priority areas found in the PRO-IDEAL PLUS survey (quantitative) and their relation compared to the first set of Round Tables (qualitative). The table is an extended version of the table presented in the PI+ survey. The first column presents the priority number concerning the PI+ survey, accompanied of the related challenge of the ICT Work Programme 2011- 2012. Cross-marks in each box below the countries establish the incidence of the priority in the survey.

If the box is coloured in green, it establish that the related priority was highlighted during the Round Tables in Mexico, Colombia, Costa Rica and Cuba, or extracted from official documents (e.g. the Argentinean White Paper) in Argentina, Brazil and Chile. The frequency of the green cells, pondered with the PI+ survey, establishes the Priority Number related to the Round Table in the last (right) column.

Top 10 ICT Research Priorities by country

PI+ Survey Priority No.	Challenge No.	Objective	Argentina	Brazil	Colombia	Costa Rica	Cuba	Chile	Mexico	Uruguay	Round Tables Priority No.
1	8	Technology-enhanced learning	X	X	X	X	X	X	X	X	6
2	4	Intelligent Information Management	X		X	X	X	X	X	X	1
3	6	ICT systems for energy efficiency (and emission reduction)	X	X		X	X	X	X	X	10
4	6	ICT for efficient water resources management	X	X	X	X	X	X	X		4
5	1	Future Networks	X	X	X	X		X	X		5
6	3	Computing Systems			X	X	X	X	X	X	2
7	8	ICT for access to cultural resources	X		X	X		X	X	X	n/a
8	5	ICT solutions for governance and policy modelling	X		X	X	X		X		3
9	6	Smart Energy Grids	X			X		X	X	X	n/a
10	5	Patient Guidance Services (PGS), safety and healthcare record information reuse	X		X		X			X	n/a
11	1	Trustworthy ICT					X	X	X		n/a
12	4	Digital Preservation	X					X		X	n/a
13	1	Cloud Computing, Internet of Services and Advanced Software Engineering		X		X					8
14	3	New paradigms for embedded systems, monitoring and control towards complex systems engineering		X			X				9
15	5	ICT for Ageing and Wellbeing					X			X	n/a
16	1	Internet-connected objects		X							n/a
17	1	Future Internet Research and Experimentation			X						n/a
18	3	Very advanced nanoelectronic components		X							n/a
19	3	Smart components and smart systems integration		X							7
20	4	Language Technologies			X						n/a
21	5	Personal Health Systems - PHS		X							n/a
22	7	Manufacturing solutions for new ICT products								X	n/a

	Top Ten LA priorities, according to the PRO IDEAL PLUS survey
	Top priorities according to the results of the Round Tables.
	Challenge number of the objective according to the FP7-ICT Work Program
X	Top 10 National priorities, according to the PRO IDEAL PLUS survey

Therefore, comparing these results with those in the PI+ survey, the new consolidated Top Ten ICT priorities in LA are:

1. Intelligent Information Management
2. Computing Systems
3. ICT solutions for governance and policy modelling
4. ICT for efficient water resources management
5. Future Networks
6. Technology-enhanced learning
7. Smart components and smart systems integration
8. Cloud Computing, Internet of Services and Advanced Software Engineering
9. New paradigms for embedded systems, monitoring and control towards complex systems engineering
10. ICT systems for energy efficiency (and emission reduction).

5 CONCLUSIONS

The PRO-IDEAL PLUS Latin American countries form a region with an emerging potential for cooperation in ICT with the European Union. Under the current framework of the bilateral S&T agreements with the EC, Argentina, Brazil, Chile, and Mexico have increased the collaboration in FP7 programmes, projects and activities of mutual interest, including ICT. At the same time, Colombia, Costa Rica and Cuba have also reinforced the cooperation scenario and all target countries have recently adopted research and ICT policies and strategies that are changing the face of the region and research cooperation with the European Union, stressing the importance of the ICT sector as a strategic platform with a positive impact on all productive activities.

This phenomenon occurs since ICT acquired a continuous inclusion in economic activities in the last decades mainly due to its ability to generate high added value as well as a factor of differentiation for products and services, resulting in a competitive advantage in the market. Therefore, the ICT industry has also become an important source of supply and demand for highly skilled employment.

Similarly, Latin America researchers, policy makers and stakeholders participating in the Round Tables emphasized the importance of the exchange of experiences towards a common effort with the EU to improve cooperation in ICT R&D activities and they showed confidence to implement proposals focused on the discussed ICT topics. They also consider that synergies between ICT related policies and programs should be consolidated towards a common view for research cooperation between Latin America and the EU.

The EU-LA cooperation scenario for ICT research policies and strategies can be summarized as follows:

- Active public policies for ICT R&D as a cross technology in different value chains are growing.
- The use and penetration of ICT by the overall population (i.e., number of computers and internet connections) is still low.
- There is a scarcity of educated professionals in IT areas both in scientific and technological levels.
- Fair, but still not enough, presence of funding programs in universities and companies for ICT projects at a national level.

ICT research collaboration between LA stakeholders and European universities, research centres and private companies can make relevant progress in this context.

In this scenario, there is a wide consensus in the definition of priority areas for ICT R&D cooperation. The Latin America countries involved in PRO-IDEAL PLUS share the following top 10 ICT R&D priorities:

1. Intelligent Information Management
2. Computing Systems
3. ICT solutions for governance and policy modelling
4. ICT for efficient water resources management
5. Future Networks
6. Technology-enhanced learning
7. Smart components and smart systems integration

Identification and Analysis of ICT research priorities

8. Cloud Computing, Internet of Services and Advanced Software Engineering
9. New paradigms for embedded systems, monitoring and control towards complex systems engineering
10. ICT systems for energy efficiency (and emission reduction).

ANNEX 1 SCHEDULE ROUND TABLES

Mexico's Agenda



“PROmotion of an ICT Dialogue between Europe and America Latina”

Mesa Redonda - México

Tema: “Investigación y el desarrollo tecnológico de las TICs en México y la cooperación con la Unión Europea”

Objetivo: Discutir sobre las áreas prioritarias de Investigación y Desarrollo Tecnológico (I&D) de las TICs para México, así como definir sus perspectivas de desarrollo y de la cooperación a largo plazo con énfasis en el alineamiento con las prioridades para I&D en TICs de la Unión Europea.

Programa

Lugar: CONACYT, Av. Insurgentes Sur 1582, Col. Crédito Constructor Del. Benito Juárez C.P.: 03940, México, D.F.

Fecha: 24 de Mayo de 2011 (13:45 a 18:00 horas)

Martes, 24 de Mayo 2011	
13:45-14:00	Registro
14:00-14:15	Bienvenida Dr. Miguel Gonzalez Mendoza – <i>Coordinador Pro-Ideal-Plus-México (Tecnológico de Monterrey)</i> Dr. Hector Samano Rocha – <i>Director UEMEXCYT-2 (CONACYT)</i> Dr. Neil Hernández Gress – <i>NCP ICT Mexico (Tecnológico de Monterrey)</i>
14:15-14:45	Presentación: Prioridades de las TICs en LA y colaboración bilateral UE-AL (México) en TICs (<i>Miguel Gonzalez Mendoza</i>)
14:45-17:15	
Mesas Redondas de Trabajo Interactivo	
División en 3 mesas redondas interactivas para la elaboración de tres temas principales de discusión que conducirán al acercamiento de los objetivos principales:	
<ol style="list-style-type: none"> 1. <i>Discutir sobre las áreas prioritarias de I&D de las TICs</i> 2. <i>Perspectivas de desarrollo al largo plazo con las prioridades de la Unión Europea</i> 	
Temas de las tres mesas:	
Mesa 1: Identificar áreas prioritarias de interés de I&D en TICs (basadas en la encuesta)	
<ol style="list-style-type: none"> a) <i>¿Cuáles son las áreas prioritarias de TICs para I&D que en su opinión son importantes para México? (seleccione 3 y enumérelas por el rango de importancia)</i> b) <i>¿En cuáles de estas áreas ve usted el potencial de una cooperación en I&D con la Unión Europea?</i> c) <i>¿De qué manera podrían los acuerdos de cooperación internacional actuales favorecer el desarrollo de estas áreas?</i> 	
Mesa 2: Gestión y formación de talento para I&D en TICs	
<ol style="list-style-type: none"> a) <i>¿Qué acciones considera más importantes para consolidar las actividades de investigadores y de expertos en desarrollo tecnológico en TICs en México?</i> b) <i>¿Qué acciones del sector gubernamental y empresarial considera importantes para mejorar la gestión y formación de recursos humanos para I&D en TICs en México?</i> c) <i>¿Qué acciones recomendaría para tener una sinergia universidad-empresa para impulsar y fortalecer proyectos de innovación tecnológica a través de la formación de recursos humanos? (a nivel México y a nivel AL-UE)</i> 	
Mesa 3: Infraestructura para I&D en TICs	
<ol style="list-style-type: none"> a) <i>¿Cuáles son en su opinión las áreas prioritarias en TICs en términos de infraestructura para I&D en México? (seleccione 3 y enumérelas por el rango de importancia)</i> b) <i>¿Qué elementos son necesarios para propiciar el desarrollo de la infraestructura para I&D en TICs (sector político, público y privado)?</i> c) <i>¿Qué áreas prioritarias en infraestructura que pudieran impulsar una sinergia importante con AL y la UE?</i> 	
14:45-15:00	Descripción del método de trabajo (<i>moderador explica las reglas</i>)
15:00-15:15	Presentación de los participantes (<i>en parejas, cambio cada 2 minutos</i>)
15:15-16:45	Trabajo en las mesas temáticas (<i>tres rondas de 30 minutos c/u</i>)
16:45-17:15	Última ronda para resumir los resultados de cada mesa (<i>30 minutos</i>)
17:15-17:45	Presentación de resultados (<i>10 minutos por mesa</i>)
17:45-18:00	Conclusiones y cierre

Colombia's Agenda



“PROMotion of an ICT Dialogue between Europe and America Latina”

Mesa Redonda - Colombia

Tema: “Investigación y el desarrollo tecnológico de las TICs en Colombia y la cooperación con la Unión Europea”

Objetivo: Discutir sobre las áreas prioritarias de Investigación y Desarrollo Tecnológico (I&D) de las TICs para Colombia, así como definir sus perspectivas de desarrollo y de la cooperación a largo plazo con énfasis en el alineamiento con las prioridades para I&D en TICs de la Unión Europea.

Programa

Lugar: Hotel Sheraton Four Points Cra 43 C No. 6 Sur 100 Medellín Colombia

Fecha: 02 de Junio de 2011 (12:00 a 17:00 horas)

Jueves, 2 de Junio de 2011	
12:00 – 13:00	Registro y almuerzo
13:00 - 13:15	Bienvenida: Dr. Jairo José Espinosa Oviedo – <i>Coordinador Pro-Ideal-Plus-Colombia</i>
13:15-13:45	Presentación: ARTICA
13:45-17:00	
Mesas Redondas de Trabajo Interactivo	
División en 3 mesas redondas interactivas para la elaboración de tres temas principales de discusión que conducirán al acercamiento de los objetivos principales:	
<ol style="list-style-type: none"> 1. <i>Discutir sobre las áreas prioritarias de I&D de las TICs</i> 2. <i>Perspectivas de desarrollo al largo plazo con las prioridades de la Unión Europea</i> 	
Temas de las tres mesas:	
Mesa 1: Identificar áreas prioritarias de interés de I&D en TICs (basadas en la encuesta)	
a) ¿Qué tanto coinciden los resultados de la encuesta sobre las prioridades de TICs en I&D para Colombia con las prioridades que usted identifica como importantes para la sociedad Colombiana?	
b) ¿Cuáles son las áreas prioritarias de TICs para I&D que en su opinión son importantes para Colombia? (seleccione 5)	
c) ¿Qué rango de importancia para estas áreas daría usted relativo al crecimiento económico de la sociedad Colombiana?	
d) ¿En cuáles de estas áreas ve usted el potencial de una cooperación con la Unión Europea?	
e) ¿Cómo podrían los acuerdos de cooperación internacional, como latinoamericanos y de la UE, contribuir en cumplir de la mejor manera con los objetivos de las áreas prioritarias en TIC?	
Mesa 2: Gestión y formación de talento para I&D en TICs	
a) ¿Cómo se puede aumentar el número total de expertos para I&D en TICs en Colombia?	
b) ¿Qué acciones considera más importantes para consolidar las actividades de los expertos investigadores y en desarrollo tecnológico en TICs en Colombia?	
c) ¿Qué acciones del sector gubernamental y empresarial considera importantes para mejorar la gestión y formación de recursos humanos para I&D en TICs en Colombia?	
d) ¿Qué acciones recomendaría para tener una sinergia universidad-empresa para impulsar y fortalecer proyectos de innovación tecnológica a través de la formación de recursos humanos? ¿A nivel de Colombia? ¿A nivel regional con AL? ¿A nivel AL-UE?	
e) ¿Qué elementos podrían propiciar la expansión y consolidación de Programas Académicos que cumplan con estándares internacionales relativos a la gestión y formación de expertos de TICs en Colombia?	
Mesa 3: Infraestructura para I&D en TICs	
a) ¿Cuáles son en su opinión las áreas prioritarias infraestructurales de las TICs para I&D en Colombia?	
b) ¿Cuál es el estado actual de la infraestructura en estas áreas?	
c) ¿Qué elementos son necesarios para propiciar el desarrollo de la infraestructura para I&D en TICs (sector político, público y privado)?	
d) ¿Cuáles son las áreas prioritarias en infraestructura que pudieran impulsar una sinergia importante con AL y la UE?	
13:45 - 14:00	Descripción del método de trabajo (<i>moderador explica las reglas</i>)
14:00 - 14:15	Presentación de los participantes (<i>en parejas, cambio cada 2 minutos</i>)
14:15 - 15:45	Trabajo en las mesas temáticas (<i>tres rondas de 30 minutos c/u</i>)
15:45-16:15	Última ronda para resumir los resultados de cada mesa (<i>30 minutos</i>)
16:15-16:45	Presentación de resultados (<i>10 minutos por mesa</i>)
16:45-17:00	Conclusiones y cierre

Cuba's Agenda and Survey



“PROMotion of an ICT Dialogue between Europe and America Latina”

Mesa Redonda - Cuba

Tema: “Investigación y el desarrollo tecnológico de las TICs en Cuba y la cooperación con la Unión Europea”

Objetivo: Discutir sobre las áreas prioritarias de Investigación y Desarrollo Tecnológico (I&D) de las TICs para Cuba, así como definir sus perspectivas de desarrollo y de la cooperación a largo plazo con énfasis en el alineamiento con las prioridades para I&D en TICs de la Unión Europea.

Programa

Lugar: *SOFTEL*

Fecha: 14 de junio de 2011, 9:00 horas.

14 de Junio 2011	
Moderador:	Luis Guillermo Fernández, Director General SOFTEL
Bienvenida:	Luis Guillermo Fernández, Director General SOFTEL
<p>Análisis y discusión de los resultados de la encuesta realizada entre los participantes que conducirán al acercamiento hacia los objetivos principales:</p> <ol style="list-style-type: none"> 1. <i>Áreas prioritarias de I&D de las TICs</i> 2. <i>Perspectivas de desarrollo al largo plazo con las prioridades de la Unión Europea</i> <p>Temas a tratar:</p> <ol style="list-style-type: none"> 1: <u>Identificar áreas prioritarias de interés de I&D en TICs.</u> 2: <u>Gestión y formación de talento para I&D en TICs</u> 3: <u>Infraestructura para I&D en TICs</u> 	
Agenda	
1	Descripción del método de trabajo
2	Presentación de los participantes
3	Presentación de resultados
4	Discusión de los resultados
5	Conclusiones y cierre

The Round Table in Cuba was held in accordance with the agenda, taking into account the following survey previously sent to participants:



“PROmotion of an ICT Dialogue between Europe and America Latina”

Mesa Redonda - Cuba

Tema: “Investigación y el desarrollo tecnológico de las TICs en Cuba y la cooperación con la Unión Europea”

Con el objetivo de seguir profundizando en el trabajo entre Cuba y la Unión Europea, a través del proyecto PRO-IDEAL PLUS se solicita su colaboración en la respuesta de la siguiente encuesta. Esto da continuidad al trabajo que se comenzó a desarrollar en el mes de marzo en el evento efectuado en el Hotel Nacional.

Tema 1: Identificar áreas prioritarias de interés de I&D en TICs.

Como resultado del Taller Interactivo “Safari” efectuado en Marzo de 2011 se obtuvieron las áreas prioritarias de investigación en las que Cuba puede aportar valor añadido a proyectos en colaboración con Europa en los próximos años.

a) *¿Cuáles son las áreas prioritarias de TICs para I&D que en su opinión son importantes para Cuba? (enumérelas por el rango de importancia)*

Áreas de investigación en las que Cuba puede aportar valor añadido	Prioridad
Investigaciones aplicadas a la Educación	
Investigaciones aplicadas a la Salud	
Nanotecnologías y nuevos materiales	
Informática aplicada a la Geografía	
Sistemas de Información Geográfica (SIG) para la prevención de desastres	
Aplicaciones a la Biotecnología	
Bioinformática	
Medios digitales, contenidos cubanos, redes de conocimiento	
Energías alternativas	
“Tropicalización”: Adaptar a nuestras condiciones las investigaciones desarrolladas para otras latitudes.	
Desarrollo y uso de aplicaciones de código abierto (Free Software, Open Source)	
Gobierno electrónico (e-government)	
Desarrollo de Software básico	
Otras: <i>Diga cuales</i>	

b) *¿En cuáles de estas áreas ve usted una potencial cooperación en I&D con la Unión Europea?(marque con una X)*

Áreas de investigación en las que Cuba puede aportar valor añadido	Marque con una X
Investigaciones aplicadas a la Educación	
Investigaciones aplicadas a la Salud	
Nanotecnologías y nuevos materiales	
Informática aplicada a la Geografía	
Sistemas de Información Geográfica (SIG) para la prevención de desastres	
Aplicaciones a la Biotecnología	
Bioinformática	
Medios digitales, contenidos cubanos, redes de conocimiento	
Energías alternativas	
“Tropicalización”: Adaptar a nuestras condiciones las investigaciones desarrolladas para otras latitudes.	
Desarrollo y uso de aplicaciones de código abierto (Free Software, Open Source)	
Gobierno electrónico (e-government)	
Desarrollo de Software básico	
Otras: <i>Diga cuales</i>	

Identification and Analysis of ICT research priorities

En el Taller Interactivo "Safari" también se determinaron cuales podrían ser los proyectos TIC de gran relevancia y éxito en Cuba que podrían extenderse en un proyecto de investigación colaborativa con la Unión Europea.

c) *¿De qué manera podrían los acuerdos de cooperación internacional actuales favorecer el desarrollo de estas áreas?*

Utilice una escala del 1 al 5, donde 1 no favorecen el desarrollo del área y 5 si favorezcan el desarrollo de estas áreas.

No.	Proyectos TIC de gran relevancia y éxito en Cuba	1	2	3	4	5
		No favorecen	←		→	Si favorecen
1.	Salud					
	• Modelado biomédico					
	• Laboratorios itinerantes					
	• Equipos para la salud					
	• Biotecnología					
	• Segunda opinión para el diagnóstico					
2.	Empresa					
	• Gestión y análisis de la energía					
	• Gestión empresarial					
3.	Educación					
	• Aplicaciones para e-learning					
	• Videojuegos, simuladores					
4.	Gobierno electrónico					
	• Informatización de la sociedad					
	• Gestión aduanera					
	• Sistema de información geográfica					
5.	Medio ambiente y Cambio climático					
	• Sistema para alertas tempranas					
6.	Desarrollo de sistemas de computación					
	• Sistemas de código abierto					
	• Cloud computing					
	• Seguridad informática					
	• Plataformas de administración de aplicaciones web					
	• Software básico					
7.	Dispositivos para la automatización de la agricultura					
8.	Televisión digital					
9.	Robótica y sistemas cognitivos					
10.	Nanotecnología					
11.	Otras: Diga cuales					

Tema 2: Gestión y formación de talento para I&D en TICs

En el "Safari" se obtuvieron cuales podrían ser los próximos pasos para crear propuestas exitosas en el 7PM en TIC y mejorar la cooperación entre Cuba y la Unión Europea.

a) *¿Qué acciones considera más importantes para consolidar las actividades de investigadores y de expertos en desarrollo tecnológico en TICs en Cuba? (enumérelas por el rango de importancia)*

Pasos para crear propuestas exitosas en el 7PM en TIC	Prioridad
Conocer el funcionamiento del 7PM	
Identificar temas de intereses comunes a partir del programa del 7PM en el área de las TIC.	
Dominar metodología: normas, procedimientos y herramientas mediante talleres y capacitación para la presentación de proyectos.	
Identificar nuestras fortalezas y hacerlas visibles siendo preactivos y utilizando herramientas informáticas.	
Identificar partners y líderes europeos.	
Ampliar espacios de divulgación en Cuba con actividades de promoción del 7PM como seminarios para gestores.	
Otras: Diga cuales	

Identification and Analysis of ICT research priorities

b) *¿Qué acciones del sector gubernamental y empresarial considera importantes para mejorar la gestión y la formación de los recursos humanos para I&D en TICs en Cuba? Mencione 3 como mínimo y enumérelas por el rango de importancia.*

Acciones del sector gubernamental y empresarial importantes para mejorar la gestión y formación de recursos humanos	Prioridad

c) *¿Qué acciones recomendaría para tener una sinergia universidad-empresa para impulsar y fortalecer proyectos de innovación tecnológica a través de la formación de recursos humanos? (a nivel Cuba y a nivel AL-UE). Mencione 3 como mínimo y enumérelas por el rango de importancia.*

Acciones para tener una sinergia universidad-empresa	Prioridad

Tema 3: Infraestructura para I&D en TICs

d) *¿Cuáles son en su opinión las áreas prioritarias en TICs en términos de infraestructura para I&D en Cuba? (Mencione como mínimo 3 y enumérelas por el rango de importancia)*

Áreas prioritarias en TICs en términos de infraestructura para I&D	Prioridad

e) *¿Qué elementos son necesarios para propiciar el desarrollo de la infraestructura para I&D en TICs ? (Mencione como mínimo 3 y enumérelas por el rango de importancia)*

Elementos son necesarios para propiciar el desarrollo de la infraestructura para I&D	Prioridad

f) *¿Cuáles son las áreas prioritarias de la infraestructura de la I&D en TICs que pudieran impulsar una sinergia importante con AL y la UE? (Mencione como mínimo 3 y enumérelas por el rango de importancia)*

Áreas prioritarias en infraestructura que pudieran impulsar una sinergia importante con AL y la UE	Prioridad

Costa Rica's Agenda



Foro Desayuno Políticas Públicas en TIC – Costa Rica

Tema: "Investigación y el desarrollo tecnológico de las TICs en Costa Rica y la cooperación con la Unión Europea"

Programa

Miércoles, 15 de Junio 2011		Hotel Barceló San José Palacio (Salón El Coral), San José Costa Rica.	
07:30-08:00	Registro		
08:00-08:05	Bienvenida	Otto Rivera, <i>Director Ejecutivo CAMTIC</i>	
Presentaciones y Desayuno			
08:05-08:20	<ol style="list-style-type: none"> Cooperación Europea y 7 PM (<i>José Luis Martínez Prada, Encargado de Negocios de la Unión Europea</i>) PRO-IDEAL PLUS (<i>Otto Rivera, Director Ejecutivo CAMTIC</i>) NCP (<i>Keilor Rojas, Ministerio de Ciencia y Tecnología</i>) 		
08:20-08:50	Plan Nacional de Ciencia y Tecnología e Indicadores Nacionales de Ciencia y Tecnología (<i>Ing. Alejandro Cruz Molina, Ministro de Ciencia y Tecnología</i>)		
08:50-09:05	Estrategia Costa Rica Verde e Inteligente 2.0 (<i>Paul Fervoy, Vicepresidente, CAMTIC</i>)		
09:05-11:35			
Mesas Discusión (Trabajo Interactivo)			
División en 3 mesas redondas interactivas para la elaboración de tres temas principales de discusión que conducirán al acercamiento de los objetivos principales:			
<ol style="list-style-type: none"> Discutir sobre las áreas prioritarias de I&D de las TICs Determinar las Perspectivas de desarrollo al largo plazo con las prioridades de la Unión Europea 			
Temática de discusión:			
<u>Identificar áreas prioritarias de interés de I&D en TICs (basadas en la encuesta)</u>			
<ol style="list-style-type: none"> ¿Cuáles son las áreas prioritarias de TICs para I&D que en su opinión son importantes para Costa Rica? (seleccione 3 y enumérelas por el rango de importancia) ¿En cuáles de estas áreas ve usted el potencial de una cooperación en I&D con la Unión Europea? ¿De qué manera podrían los acuerdos de cooperación internacional actuales favorecer el desarrollo de estas áreas? 			
<u>Gestión y formación de talento para I&D en TICs</u>			
<ol style="list-style-type: none"> ¿Qué acciones considera más importantes para consolidar las actividades de investigadores y de expertos en desarrollo tecnológico en TICs en Costa Rica? ¿Qué acciones del sector gubernamental y empresarial considera importantes para mejorar la gestión y formación de recursos humanos para I&D en TICs en Costa Rica? ¿Qué acciones recomendaría para tener una sinergia universidad-empresa para impulsar y fortalecer proyectos de innovación tecnológica a través de la formación de recursos humanos? (a nivel Costa Rica y a nivel AL-UE) 			
<u>Infraestructura para I&D en TICs</u>			
<ol style="list-style-type: none"> ¿Cuáles son en su opinión las áreas prioritarias en TICs en términos de infraestructura para I&D en Costa Rica? (seleccione 3 y enumérelas por el rango de importancia) ¿Qué elementos son necesarios para propiciar el desarrollo de la infraestructura para I&D en TICs (sector político, público y privado)? ¿Cuáles son las áreas prioritarias en infraestructura que pudieran impulsar una sinergia importante con AL y la UE? 			
09:05-09:20	Descripción del método de trabajo (<i>moderador explica las reglas</i>)		
09:20-09:35	Presentación de los participantes		
09:35-10:35	Trabajo en las mesas temáticas (<i>tres rondas de discusión 20 minutos c/u</i>)		
10:35-11:00	Ultima ronda para resumir los resultados de cada mesa (<i>25 minutos</i>)		
11:00-11:45	Presentación de resultados (<i>15 minutos por mesa</i>)		
11:45-12:00	Conclusiones y cierre		