The Emergence and Development of a Regional Living Lab: The Case of San Luis, Argentina

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1. INTRODUCTION

The Province of San Luis, located in the center-west region of Cuyo in Argentina, has a relatively small population of 447,138 inhabitants.[1] This relatively small number has revealed itself as an advantage in the province´s vigorous campaign to integrate its population into the Knowledge Society, and in a further step, to the Innovation Society. This paper describes and analyzes the implementation and development of a digital province, a regional living lab, which is building a path to social and technological innovation.

This paper describes the results of two field research projects, on the characteristics and span of the Digital San Luis Program (San Luis Digital, SLD) sponsored by the Provincial Government and in which local governments have been actively involved. The paper focuses on the use of information and communication technology (ICT) in the social innovation processes sponsored by the Provincial Government through agreements with other social actors. Through the analysis of the SLD model, the paper develops the hypothesis that the whole Province is an actual living lab. The research methodology was mainly meta research, i.e. the integration of models, theories, data and information from various local and international sources. This information was validated with input from field surveys made ad-hoc in San Luis Province by the Provincial Directorate of Statistics and Censuses. The scope and impacts were studied in 10 towns through 108 interviews with leaders, participants and beneficiaries of San Luis Digital: those responsible for programs, employers, providers, mayors, directors of schools, teachers, members of community organizations, teachers college, students, users of cyber AUI, centers of Digital inclusion, etc., and institutions or partners or recipients of San Luis Digital programs. After analyzing the characteristics of the San Luis Digital model, the paper describes its achievements, and analyzes its limitations.

The Austrian-American economist Joseph Schumpeter (1935) states that the entrepreneur is not the inventor of a given discovery, but the instrument who orients this finding or invention to the enterprise, the industry, or in a larger sense, to the economy, to be constructed, produced, and distributed. Schumpeter refers to the entrepreneur-innovator as an individual. However, in this paper we consider that this social agent may also be an innovative organization, such as a governmental agency or a University. In the case of the San Luis Province, this agent is the University of La Punta (ULP). This public University was created by the Province´s Government with the purpose of training professionals in strategic areas linked to the progress of the Province. According to this criterion, the University identifies careers in Cinema - in accordance with the Law for the Promotion of the Film Industry - and software development, according to the Province´s agreement to the National Law of Promotion of Software Industries. The ULP also trains professionals in the areas of tourism, agro-enterprise management, and environment.

This paper is based on quantitative and qualitative research carried on between the years 2008 and 2011. The original purpose of this work was to provide the ULP with up-to-date data on the impacts and scope of the Digital San Luis programs, and with information regarding the perception of actors and beneficiaries of these programs, their openness, ability to receive innovations, and needs.

2. A BRIEF HISTORY OF THE DIGITAL SAN LUIS PROGRAM (SLD)

On June 21st, 2007, the San Luis province launched Digital San Luis (SLD in its Spanish acronym), a 20-year long plan conceived to make the Province´s inhabitants proactively integrate into the Information and Knowledge Society and to position the Province as a producer and exporter of information technologies (IT) goods and services. SLD was deployed by the Universidad de La Punta (ULP), an autonomous and self-governing organization that decided to fully use the potentials of the Information Highway implemented in the province in 2004. The Plan´s main goal is the digital inclusion of all the province´s inhabitants, collaborating with the regional development activities at the economic, educational, social, and technological levels.

The initial initiative included three phases. The first was to strengthen the La Punta Information Park (PILP), created by provincial Law N° VIII 0502-2006, and located at the ULP campus. The objective was to generate a cluster of enterprises dedicated to the IT market and invigorate the relationship between the academia and the companies in the sector. To achieve this, San Luis offered physical space, a Fund to finance working capital, a financial incentive for the recruitment of local labour, and access to fiscal benefits. The PILP intends to position San Luis as a world competitor in software and information services´ products. The second phase of the project is proposed as a medium-term goal, focused on training teachers and young people in information technology. For the long-term, the SLD project means to extend and deepen ICT education for all children in primary level education. The challenge, which initially consisted of achieving 70%-75% of digital inclusion in the population of the province, has been extended to 100% (in December 2011, the Internet´s penetration among the Province´s population has reached 95%).

This Plan has valuable precedents: the strategic plan of the San Luis Government began in 1998. In 2001 it implemented its Master Plan. In the following years various stages were executed, until the present policy of technological services was finally implemented. In 1998, the Province´s Government signed an agreement with the Canadian Ministry of Industry for the development of a strategic plan to implement the Information Highway. Two years later, on the basis of this Master Plan, a national and international bid to hire the enterprise that would undertake this project was launched. In year 2001, the San Luis province selected the enterprise, NEC Argentina S.A., for the implementation of the Information Highway, and in year 2006, San Luis Telecomunicaciones (San Luis Telecommunications) was created.

Ultimately, the ULP, at the request of the Government of the Province of San Luis, took over the management, operation and maintenance of the Information Highway (Autopista de la Información, or AUI), which is used as the basis of the technological infrastructure, for the programs that integrate SLD. Currently, SLD has more than 235 initiatives running. The province´s Platform of Technological Services deploys its communication network though the Information Highway. It interconnects over 1200 points, distributed all over the province, connecting all settlements of more than 20 people and providing services to the community. This is the largest communication system coverage in Latin America.

3. THE DIGITAL SAN LUIS MODEL

A Triple Helix-based approach to regional development originated in Boston during the Great Depression of the 1930s (Etzkowitz, 2002), and has since spread across the US and further afield to other continents, supplying a dynamic framework for the interaction of a variety of institutions and stakeholders, broadly encompassed by 'University', 'Industry' and 'Government' (Etkowitz and Ranga, 2009). Academia, government, and industry constitute the three helices that engage in triple helix innovation. Educational institutions of higher learning (colleges and universities) mostly represent academia in this model; nevertheless, educational institutions at other levels are not precluded from contributing to, and participating in, triple helix innovation processes. Government may be represented by any of the three levels of government and their owned corporations: Federal (national), state (provincial), and local (municipal). There are no restrictions on the types of industry (firm) involvement in triple helix innovation processes: i.e., industry may be represented by private corporations, partnerships, or sole proprietorships. In Argentina, the triple helix model has been particularly used at the regional level in the last

decade; collaboration among academia, enterprises, and governments has been implemented to strengthen clusters or to generate technopoles.

The Digital San Luis model (which we call the Quadruple Helix) intends to go further. It articulates the multi-directional interaction among the following social actors: the Province´s government, as the policy´s designer and executor; academia, as producer of knowledge and provider of technology and trained human resources; IT enterprises, as identifiers of technology requirements but also as technology producers; the community, not only as users of technological goods and services, but also as co-producer of these.
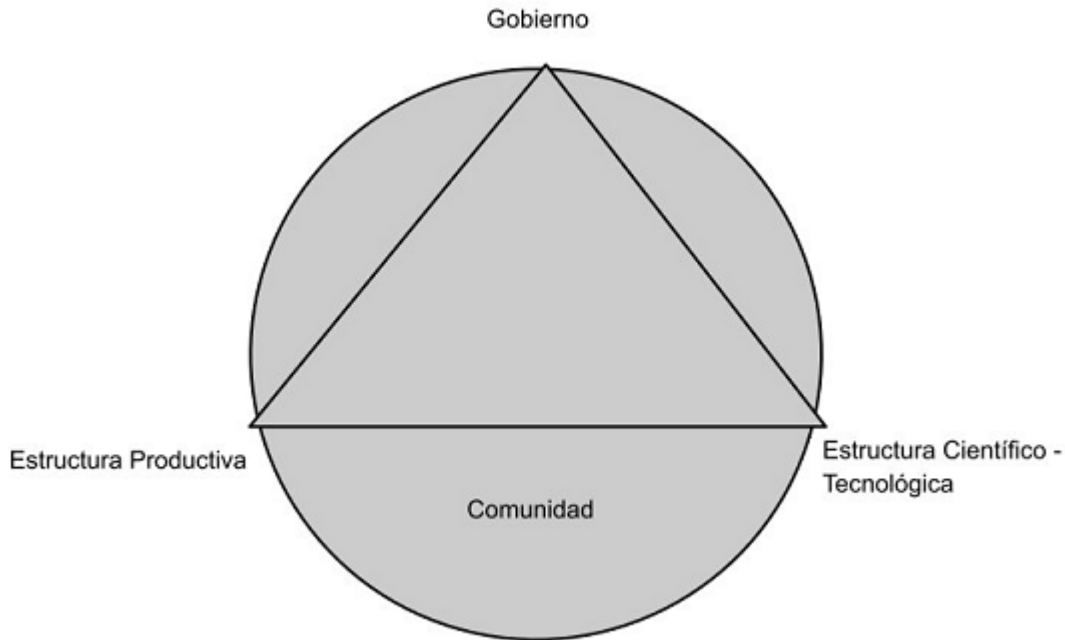

Figure 1. Digital San Luis Model

Note the community´s participation, as users, co-creators, and as future engineers and technicians. Human resources to work in this model, requires permanent training in the capacities developed and required by the diverse SLD plans and programs. SLD´s strategies are based on a set of conceptual models.

4. THE CONCEPTUAL BASIS. WHY CAN SAN LUIS BE CONSIDERED AS A LIVING LAB?

San Luis Digital is based on the following concepts: it assumes that technologies are social; that there is no way to distinguish between a world built only by technologies and a world built only by social practices; and that society and technologies are constantly and mutually co-determining. Furthermore, DSL assumes that the strategies employed and their impacts on the community should be considered as emergent processes, and subject to constant monitoring and evaluation.

The SLD model is based on the existence of the Provincial´s Government strong support, expressed by its vision, engagement with the Program, and political leadership), which provides to the project a strong institutional, political and strategic continuity. Moreover, the University of

La Punta (ULP), as the independent and autonomous executer of the SLD, enjoys a great deal of freedom in implementing the Plan.

SLD is based on a solid infrastructure (the Information Highway - AUI, data center, WiMax and wifi networks, etc.), as well as on public access to ICTs and connectivity, implemented through public libraries, Digital Inclusion Centres, the distribution of computers in public schools, and in the possibility offered to adults to complete their secondary education using the Entre Clases Program, among others. SLD´s sectoral programs are implemented though a periphery-to-center, socially inclusive, and integrated process. It is periphery-to-center because it has been implemented from the Province´s geographic and economic periphery towards its center, from the most remote and poorest communities to the Province´s capital, San Luis City. It is socially inclusive because it addressed first children, senior citizens, and vulnerable groups, and only in a second phase, the higher income population. It is integrated because, besides providing a connectivity infrastructure and access devices, SLD constantly launches complementary applications, programs, and contents which converge towards the social and long-term appropriation of technology.

SLD implies long-term (20 year) strategic programs. Their implementation exceeds a single governmental term, and engages several generations of San Luis´ inhabitants, providing thus the opportunity for the population to genuinely appropriate these technologies, and generating quantitatively relevant and quali-qualitative increasing medium and long-term results. In the first phases of the process, the organizations that promote and support SLD have a high degree of control over the most relevant initiatives, decisions, and actions (design and budget, the selection of partners, the best locations and time to develop these actions, etc.). Local partners and beneficiaries have little influence on the Program in these phases. However, as the initiatives are implemented and disseminated, as concrete activities are developed, and as the participants/beneficiaries become more active, local actors acquire a larger opportunity for an active engagement and role.

Education is considered the key element of the SLD model; it is integrated into diverse policies, strategies, and programs. Education is conceived of not only as tje formal educational system, comprising pre-school to university, but also life-long training and learning, as well as informal education. SLD´s vision of educating the population for the Information Society is not limited to traditional institutions (schools and universities), but also extends to an "educational society", using the Digital Inclusion Centers, the Astronmic Observatory (Solar de las Miradas, the only open-air observatory in the world, operating 2006 at the La Punta University Astronomic Park), student internships at the PILP, educational and communication networks such as "Networking Senior Citizens", among others.

In 2011 the Digital Public Schools (Escuelas Públicas Digitales, EPD) were created. They consist of an innovative pedagogical design, in which grades are replaced by educational modules: Mathematics, Science and Technology, Art, and others. Each student may progress in the various modules at his or her own pace, which avoids the potential for the feared grade repetition, and boredom. Three EPDs have already been created, and 42 more are planned in the whole territory.

This vision focuses also on multisectoral relationships (between the State, the University, enterprises, and NGOs) to establish a common knowledge base for all the sectors concerned with education and training. The model also bestows a high importance on international links, in order that the educational system can profit from international best practices, research, and exchanges. The Province acts in both the role of ICT promoter and consumer, while also acting as an intermediary and facilitator between IT enterprises and users. Briefly, SLD is a user-centered model, through programs which comprise a diversity of targets: different educational levels, ages, genders, geographical location, income, etc.

This paper proposes the idea that San Luis Province can be considered a Living Lab because its conceptual frame is based on the following goals:

a) Placing the Province of San Luis as a reliable producer of ICT goods and services in the national and international levels

The first phase consisted in the generation of an IT enterprise´cluster, as well as strengthening the links between the scientific sector and the enterprises. The instrument to achieve this goal was as already noted the establishment and consolidation of the La Punta IT Park. This strategy is based on a characteristic of ICT: the expansion of these technologies is not anchored by geography or to the existence of natural resources. As stated by Hervé Fischer,[2] a governmental decision may implement technological poles in any urban or periurban area, attracting to it financial, human and technological resources, through the provision of fiscal initiatives and appropriate infrastructure.

b) Reinforcing the user-technology relationship

The SLD Plan not only focuses on the dissemination and social appropriation of ICT, but also on how the inhabitants use these technologies in their everyday life. Users and technologies are perceived as the two faces of the same issue: the co-construction of socio-technical innovations, which reach beyond the determinist visions of technology.[3] Since the use and appropriation of technological goods and services depend on the users´ cultural capital, the SLD model focuses particularly on the reformulation of the whole educational system for individual and socially meaningful appropriation of ICT.

c) Re-formulating the Province´s educational system

Information Society economies are increasingly complex. The speed of technological innovations in the world is so rapid that policy planners have to make projects for yet unknown realities. When change is the only sure factor, the only certainty is that education should lead these changes. One of the higher challenges for SLD policy planners was to leave aside the tendency to compartamentalize policies and strategies, and aim for an integrated model, linking together all the strategies that have impacts on students of all ages and levels.

The SLD model considers that it is not only important for the Province´s inhabitants to have ICT access and to master computers and the Internet. It is equally relevant to develop the generic capacities for logical reasoning (Spanish, chess, Mathematics, and special reasoning: Geography, History, and Astronomy). In order to use the Internet for development, it is necessary to build social capital, cultural initiatives, and general capacities beyond the use of ICTs. On the other hand, it is important to consider life-long learning, .This is becoming increasingly necessary: as within a decade, no one will be able to work or even interact with others using the knowledge that is being currently taught. Online education and the possibility of undertaking this education at any age, with the occasional presence on a University campus or at school, is becoming increasingly important.

d) Mediating between technology production and consumption

The SLD Program introduces a relevant element for users' co-construction of technology: the process of ULP´s mediation between technology production, its dissemination, and its final use by the Province's inhabitants. In this process, users venture through increasingly distant frontiers in their use of technologies, and in the process they formulate their own needs and learning demands from the Program. The La Punta University´s mediation is not just limited to extending physical access to ICT, through increasing the inhabitants' private access (distribution of fee netbooks, credits for the acquisition of computers, etc.) and public use facilities (Digital Inclusion Centers, Entre Clases Program, etc.), but they are also providing social and cultural opportunities for the community to have access to new tools and to increase their cultural landscape.

5. THE MOST RELEVANT PROGRAMS AND THEIR OUTCOMES

The large number of SLD programs makes it difficult to fully describe them in this paper. Thus, only a few can be mentioned. The programs´description is organized according to SLD´s main axes: Infrastructure, Government, Production, Educational, and Legal Framework. The Technological and Legal Framework axis are transversal to all of these.

1. Infrastructure for social inclusion

1.1. The Information Highway (Autopista de la Información, AUI)

The Information Highway (AUI), developed on a network of San Luis' own optical fiber and radio links, [4] is mainly a platform for public-access telecommunications and services infrastructure. With it the San Luis Province has implemented the necessary digital infrastructure to build the Information and Knowledge Society adapted to its own specific context, and to become integrated into global networks and projects. For the Province, the AUI is a valuable organizational resource, both between population centres and administrative levels, and between the State and the citizens. The Technological Services´ Platform, through the AUI, interconnects all the public administration´s departments. Each Ministry, school, hospital, police station, has access to connectivity. Every inter-governmental communication circulates through the Province´s own networks. The AUI is equipped with a modern network covering 76.784 km2, and using more than 250 km of optical fiber.

The AUI connects every town and village in the Province. In October 2009 the international enterprises Motorola and Convergencia Research assessed the digital levels of 150 cities in 15 Latin American countries. The city of San Luis was placed in the fourth place, and in first place when using the Engagement/ Digital Gap indicator, reflecting the overall success of the implementation of the SLD Digital Agenda. The AUI comprises a main ring, connected through optical fiber and last generation radiolinks. Its ring-shaped topology allows for very high performance. Smaller villages are connected to this ring through dedicated radiolinks. Additionally, an Access Point has been implemented in each town and village. This telecommunications infrastructure (more than 1,200 connected points) makes it possible for the SLD to provide Internet, telephony and added value services to all communities: e-mail, E-Government services, etc.

La Punta University manages AUI´s Call Center, providing answers and solutions to users' questions about the network and services, and providing orientation and information about any issue related to the free Internet service and WiFi. The Call Center is the central intelligent axis point that concentrates and distributes information, centralizes the network´s control, and hosts the room of informatics equipment, the data repository, and the network´s management and monitoring.

In 2011 the AUI has enlarged the bandwidth in the provincial network from 1.500 Mbps to 2.000 Mbps. Moreover, the cities of San Luis and Villa Mercedes, which have the highest user density, will receive 50 Wi-Fi antennae.

1.2 WiFi localities, Wireless Connectivity, and WiMax

The Program--WiFi locality, wireless connectivity has been conceived to provide access to the Internet to every inhabitant of the Province. A Wireless Fidelity (Wi-Fi) enabled device such as a personal computer, video game console, smartphone or digital audio player can connect to the Internet when within range of a wireless network connected to the Internet. The coverage of one or more (interconnected) access points (hotspots) generally comprises an area the size of a few rooms but may be expanded to cover many square miles, depending on the number of access

points with overlapping coverage. ULP´s website [5]provides users with information about the technology, the number of connections per locality, guides and tutorials, answers to questions, and news updating.

In November 2009, the Province reinforced the WiFi service implementing the first WiMax node, which optimizes the AUI´s availability and the WiFi network bandwidth. In the first stage of its implementation, this network provided coverage to San Luis City, later to cover the cities of Villa Mercedes, Juana Koslay, and Villa de Merlo. The Antenna expansion has allowed expanding AUI´s reach, which in February 2010 provided connectivity to 84 urban and semiurban areas.

2. Government:

Digital Identity Document: The decree to call for bidding for this document was signed on December 31, 2009. This plastic card gathers together diverse documents into a single form, allowing for the physical and digital identification of the Province´s inhabitants, using a digital signature. Its back face displays the owner´s driver license, replacing the previous license granted by the Municipalities. The new document provides the user with a fiscal identity, ensuring his or her data privacy. The card also allows access to the holder´s medical history and to his or her judicial status and history. This is the first stage, the use of this card facilitates administrative, judicial and banking procedures. Later, it will be used for procedures tax and other Provincial Revenues procedures. The presentation of the document grants free entrance to Provincial events.

3. Production

The Government of the San Luis Province created the Parque Informático de la Punta within the framework of developing a knowledge-based, non-pollution economy. La Punta University is a key factor in the PILP´s generation and development. The whole process has been guided by the following instruments: grants to enterprises that locate their premises in the PILP facilities to pay for the premises rent, funds to finance the labour force, financial incentives to hire local employees, and access to fiscal benefits. By December 2011 there were 20 IT enterprises located at the PILP. ULP´s management team manages the installation of IT enterprises at the PILP. The Park also manages the San Luis population extracurricular training in IT linked to the PILP, which includes teaching programming, robotics, and instruments to attract young people to the technological world, and educating University students and training graduates to become IT projects leaders. ULP students are also trained at the PILP´s enterprises, in software such as Java, DVA, and PHP and in teamwork methodologies.

The PILP´s first building was inaugurated on April 14, 2008. On June 19, 2009 a second building was inaugurated, hosting new enterprises, and expanding the premises for the existing ones. The original (and still ongoing) strong challenge is to train qualified human resources, in order to contribute to the Province´s development. The PILP´s web page (http://www.pilp.edu.ar) features a system that eliminates intermediation between job-seekers and IT enterprises, and facilitates contacts with young IT professionals by providing the possibility of uploading their résumés for free. In turn, the enterprises may also upload their searches for human resources, so that a matchmaking may be facilitated. Both the PILP and ULP evaluate the profiles sought by the enterprises to identify the human resources existing in the Province, and in nearby provinces, as well as on what abilities the training should focus.

These programs make it possible for the enterprises to evaluate the local labour market before their physical location in the Province. Not only does the ULP train qualified professionals, but it also ensures their practical experience through internships in IT enterprises. ULP participated as a partner, funding part of the intern´s wages for 3 months. In fact, since the PILP has been opened, the salaries paid in the Software and Informatics Services sector has increased. This income tends to stay in the Province. New job positions have been generated in the IT sector. The Argentine Chamber of Software and Informatics Services Enterprises has awarded the PILP with the Sadosky Prize for Investment Projects in 2008.

4. Education

One of the most significant SLD projects is Literacy for the Future (Alfabetización para el Futuro - APF). This Plan represents the engagement undertaken by ULP in training the teachers of the Province´s educational system for the Information Society. It includes training in the teaching of Astronomy, ICT, Mathematics, Natural Sciences, and Geotechnology. In the case of ICT training, it allows teachers and students to use digital tools, building interactive electronic communication networks, which cross geographical boundaries. These networks have improved the students´ learning levels remarkably, while generating a collaborative public space which allows for the exchange of ideas, information, and experiences. In turn, the insertion of ICT into the pedagogic work as part of overall inclusion policies tends to decrease the existing educational, social, and technological gap between diverse social groups and geographic locations, and motivates teachers to work in a new didactic approach, and helps to overcome their initial resistance to ICTs.

Another important plan is "Every Kid in the Web. One to One Model" (Todos los chicos en red: Modelo 1 a 1 [6]). On Agust 22 , 2008 the ULP started to deliver computers equipped with school support to primary schools in a number of towns and villages. As well, a laptop was given to each primary school teacher in all the schools that participated in the ""Every Kid in the Web" Plan. The Plan´s goals were to improve the learning level of primary education students, using the contents specified by the Province´s Ministry of Education; to disseminate the use of ICT; include the technologies in useful knowledge for the student´s everyday life; provide digital school support; and analyze and assess the use and educational impacts of these technologies. The Plan was also oriented to include pupils in the appropriation of ICT in their daily schoolwork, facilitate digital inclusion, and promote networking.

Children from first to sixth grade (the Argentine primary school system comprises six degrees) attend school every day equipped with the Classmates delivered by SLD. It is a special computer model, protected against falls, wear and tear. The computers each cost around 500 US Dollars; they can navigate the Internet through the schools and villages´ wireless connections. An agreement was signed with each child´s parents or tutors, by which they were contracted to use the computers for educational purposes. The computers belong to the students, and they can use them freely at school, at home, or in public spaces. In December 2011, the ULP completed the distribution of computers to a total of 59,430 students. The last 7,600 netbooks were supplied to 24 schools in the city of San Luis.

6. ACHIEVEMENTS AND CHALLENGES

After analyzing the main world indexes for measuring ICT development, and based on these, we analysed the case of San Luis Province. Three main aspects were considered: Internet penetration; the acquisition of computers by the inhabitants; and their e-readiness level, taking into account the Economist Intelligence Unit´s e-readiness index. In this work we made an unexpected finding: we detected in which way the study of the SLD case throws into question the validity of many frequently used indicators. As an example, while current ICT development tends to focus on individual ICT uses, and even the customization/personalization of technologies and devices´, the conventional indexes continue to be based on homes, not individuals, as the unit of analysis. This finding was relevant to the analysis of SLD, because of the large and widespread dissemination of wireless connectivity and electronic devices that have enhanced individual use.

Internet penetration

According to the Internet World Statistics, the average Internet penetration per 100 inhabitants was, in Latin America and the Caribbean (LAC) by 2011, 30.7 users per 100 inhabitants. This means that this province, with 94.9 users per 100 inhabitants, (according to the Provincial

Institute of Statistics and Census), is more than 30% greater than the national average, and is three times the regional (LAC) average. It is important to consider that the average world Internet penetration for the same date is 30.2 Internet users per 100 inhabitants (Table 1):

	2007	2008	2009	2011
San Luis	40,0 (est.)	59,0	70,4	94,5 (est)
Argentina	40,0	50,3	56,8	66
LAC	24,0	27,9	30,7	36.2 %
World	20,0	23,8	25,6	30,2

Source: Ellaboration base don Internet World Stats.

Table 1. Percentage of total internet users

Approximately ninety-five per cent of the province's 431,000 inhabitants are Internet users, which is the highest proportion, not only in Argentina, but also in Latin America.

It is necessary to recognize that socio-economic contexts should be taken into account when comparing ICT use between diverse provinces, since the Gross Domestic Product exerts a significant influence on ICT use. For example, when comparing the San Luis Province with Buenos Aires city -the two provinces with the highest numbers of Internet users in Argentina- it should be remembered that the Gross Domestic Product per inhabitant is completely different for both regions. If we only consider that Internet penetration levels are similar, we would be forgetting the policies that made this similarity possible. While in San Luis the Provincial State has been responsible for the very large number of Internet users, in the Buenos Aires Federal District on the other hand with 66% users also according to Internet Stats (March 2011) the evolution of the connectivity level is directly linked to the higher GDP per capita in the Capital..

Considering that by 2010 the San Luis Province has invested a total of $51,685,681 USD over 10 years, and that the Province has 431,455 inhabitants, according to the 2010 National Census, it can be estimated that it has spent approximately one dollar per month and per inhabitant during that period. According to official statistics, San Luis´ GDP is approximatley $3.600 million USD. Nearly $52 million USD has been invested in ICT equipment and infrastructures, which means that the grand total spent in 10 years represents 1.4% of one year´s GDP.

The second research project, "Observatory of the social uses of ICT in San Luis", developed in 2011-2012, revealed some challenges yet to be resolved. Our research team made two field trips, in April and June 2011, to the towns of Papagayos, Villa del Carmen, El Trapiche, and Nueva Galia, to analyse how the inhabitants were using the provided ICT. In general terms, the results of the interviews revealed an underutilization of the Internet, expressed though poor knowledge about the Internet´s potential to improve business, employment opportunities, study, and communication. Most local businesses, including hotels and restaurants (even in touristic towns such as El Trapiche and Papagayos), lacked web sites, users do not use blogs, and the use of social networks, mainly Facebook, is limited to the social environment including already known friends and family (most of the interviewed internet users declared that they don´t initiate nor maintain virtual contacts with persons that they have not met physically).

Children and teenagers use the Internet mainly to play, as well as to search for information and to do school homework. Since the computers were distributed to children, the adults have started to use the Internet as well; some of them use them to search for information (newspapers, social networks), and many are using it "to control what the children do". Concerning the "technological contagion", 30.3% of the sample answered that they had influenced classmates, teachers, and/or professors with respect to the Internet and ICT; 19.7% had "infected" parents and/or siblings; 15.2%, other relatives; and another 15.2% had not had any technological influence on any person nor organization.

Concerning the place where they use computers, 31.8% of the sample answered "at home"; 22.7% use their computers at primary or secondary schools, or at the University; and 3.,8% use their computers at work. Only 6% use computers at cybercafés, CDIs or public libraries.

Most adults have never made any transaction through the Internet, they have never sold nor bought any product virtually, and have never designed nor published any blog, wiki, nor website. 90.9% of the sample has never used a personal banking service, and 87.9% has never paid for a service though the Internet. This is explained by the fact that only a low percentage of the population uses bank services at all, added to the limited number of available online services. 67.7% of the interviewed individuals expressed that they had never made an online transaction because they did not need it. However, the landscape changes when it is related to administrative transactions or information search concerning public services: 50% of the simple has done online transactions with provincial, local, or regional administrations; 78% has dealt with the tax administration; and 24.2% communicated concerning pensions or retirement; and 21.2% to obtain their identity documents.

Learning informatics was the chief drive to use computers for 24.6% of the sample, while 4.,5% was motivated by the need to increase their productivity at work, 36.9% had study as their main motivation, 23.1% were motivated by opportunity of communication (chat, e-mails, social networks), 21.5% by entertainment (games, music, videos, etc.) and 18.5% searched for general information.

The communities´ social endogamy in face-to-face life (individuals and families "have known each other forever" and they have strong families and friends social and solidarity networks with a robust local anchorage) is also shown in the virtual world. Many Internet users indicate that they keep virtual ties just with family members and friends whom they already know in the physical world.

In all the studied towns it was extremely difficult to find adults older than 55 years who used the Internet. Interviewed, elderly people said that "the Internet is fine, but it´s just for the kids", or "My grandchildren do all I need for me in the Internet". Elderly citizens that do use the Internet have learned to do so very recently (no more than two years previously), and they only use it to read the newspapers or do transactions connected with their retirement pensions.

Nevertheless, the general perception of the Internet is positive, mainly because it has allowed the communities to break their geographic isolation. Some adults participate in online courses, and many are completing their secondary studies using the "Entre Clases" programs at their local Center of Digital Integration.

The perspective for the future is hopeful: most inhabitants are interested in learning more about ICT, they have plans for buying a second computer, and no one has expressed an anti-technology position. Given that in this province most of the population had their first access to the Internet though the San Luis Digital program, it is probable that more advanced technological training and the full use of the possibilities presented through this may yet take some years. The Internet's impacts on everyday life are considered positive by 71.2% of the respondents, very positive by 16.7%, and neutral by 12.1%. None has indicated negative or very negative impacts.

It would be advisable for La Punta University to send training teams to the various towns, to make the population more aware of the full potential of the Internet, though training campaigns, workshops, exhibitions, and other means.

7. CONCLUSIONS

As for any large scale public policy, San Luis Digital is characterized by the multiplicity of participating actors, each featuring diverse roles, functions, and visions on the Knowledge

Society as a complex process. This is the reason why the clear definition of the Program´s objectives, as well as its proactive leadership, and the strong engagement of the participating actors have been key to achieving the results described above.

The program´s achievements can be perceived from different viewpoints. Concerning digital inclusion, SLD has reached the highest Internet penetration levels, not only in Argentina, but also in Latin America and the Caribbean. The policies of netbook distribution, free WiFi connectivity, and facilities for buying computers, are expressed in a highly positive perception of the Internet by more than 80% of the population.

Although SLD´s main impacts are felt in the areas of social and digital inclusion, and education, the programs have generated also a massive interest and a high value being given to ICT among San Luis´ inhabitants. ICT differ from other technologies, because users need to be educated and trained in order to fully appropriate them. An infant can learn to turn on the TV, but an ICT user has to learn new skills practically every day; therefore, a positive evaluation of these technologies is a necessary condition for their adoption and integration into everyday life. This is why every public policy for e-inclusion and innovation should first consider and give priority to the beneficiaries ´education and training.

SLD has also succeeded in creating an ICT production center in the La Punta IT Park (PILP), where 20 software and IT services enterprises are located, and where human resources are being trained. However, the challenge still to be overcome is the generation of local IT enterprises, however small they may be. Since a new generation of local engineers and technicians is being trained, it may be anticipated that, if the Provincial Government implements appropriate policies to encourage local entrepreneurs, new IT enterprises will be created.

Another challenge is the development of e-government policies. A larger number of e-government applications and transactions in the provincial and local administrations may contribute to an evolution in San Luis society in terms of digital inclusion. However, ICT and their multiple applications have already penetrated deeply into San Luis´ political, economic, social, and cultural context. The Provincial Government at the provincial, and local levels, have learnt about new ICT-based administrative procedures; and have trained civil servants in these methods. It would be desirable that these governments start initiatives to further train their civil servants, even in small communities; and restructure their administrative functions, as well as the interactions between governments, other governmental institutions, citizens, and enterprises.

Moreover, according to Feldman and Fischnaller (2011) a cultural barrier has yet to be surmounted: the strong local attachment of small communities to their own environments, and their lack of curiosity towards the external world, may be an obstacle to innovation. The capacity to integrate extended online social networks could and should enable the innovation process and overcome geographical barriers to facilitate the starting of new businesses, new studies, and a larger social life., all of which is more relevant than ever in an Information Society. Local cultural developments, festivities, art and literature, could also be disseminated to other communities.

The generation of larger social networks is not an automatic consequence of access to the Internet. This is overall responds to deeper and slower social and cultural change. The encouragement of the full social appropriation of ICT, through training and information campaigns, would accelerate this necessary social transformation.

Last but not least, it is important to signal that in this work we made an unanticipated finding: we discovered in which way the study of the SLD case puts in question the validity of many frequently used ICT indicators. While current ICT development tends to support ICT uses by individuals, the conventional indexes continue to consider homes, not individuals, as the unit of analysis unit. This outcome was relevant to our analysis of SLD, due to the high dissemination of wireless connectivity and electronic devices that have enhanced individual use.

Footnotes

[1] Instituto Nacional de Estadística y Censos, INDEC, 2009.

[2] See Hervé Fisher: "El choque digital", Editorial de la Universidad Nacional de Tres de Febrero, 2003.

[3] See Nelly Oudshoorn and Trevor Pinch: "How Users Matter. The Co-construction of Users and Technology", MIT Press, Cambridge, Massachussets, 2003.

[4] Se denomina radio enlace a cualquier interconexión entre los terminales de telecomunicaciones efectuados por ondas electromagnéticas. Si los terminales son fijos, el servicio se lo denomina como tal y si algún terminal es móvil, se lo denomina dentro de los servicios de esas características.

[5] Ver http://www.wifi.ulp.edu.ar/wifiASP/paginas/pagina.asp?PaginaWifiID=74

[6] Ver http://www.chicos.edu.ar/

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