Chapter 17

ICT as a Part of the Chilean Strategy for Development: Present and Challenges

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ICT Revolution and its Global Effects

During the second half of the last decade the world witnessed the emergence of a new reality—the Internet—and the great expectations on the effects that this new technology would bring about in many sectors of society. Each month, new publications appeared forecasting the changes that were underway. According to them countless traditional corporations would close down under the attack of new virtual competitors; the processes of vertical and horizontal integration would be reversed and a new batch of entrepreneurs would emerge, generating almost immediate wealth. In the educational field, the availability of computers and Internet in schools would drastically improve student performance while e-learning would quickly spread, guaranteeing education for life. New technologies in democratic processes would permit instant voting on a variety of subjects, ensuring truly popular representation. Governments would benefit from new technologies not only by streamlining their services but also by directing their actions more precisely and by obtaining quick feedback from citizens.

The escalation of expectations, with its correlative financial speculation, came to an end when the bubble burst at the end of 2000. We then entered a phase—in which we are now—where, at the time of being aware of the potential of change that lies within technology we realize that those foreseen changes would come about only as a result of significant efforts in the medium to long term.

The frenzy that took place at the end of the last decade left us with a promising scenario for the future ICT applications. Indeed, important investments in international broadband and wireless telephony

infrastructure—whose implementation eventually caused substantial investment losses—provided a solid material base from which to develop multiple applications. Moreover, the maturation of new financial mechanisms such as venture capital completed the scenario to make innovations possible. Markets are now starting to distinguish which business models are generating revenue, providing a key learning experience for entrepreneurs, governments and investors. There are successful businesses—Amazon, e-Bay or Google to mention a few—currently in the consolidation phase, but on a parallel and probably less publicized front, a number of e-government services have emerged around the world, bringing benefits to citizens: transaction times reductions, consolidation of transactions and transparency enhancement in the relationship of government to citizens.

The innovation potential has also expanded. The growing capabilities for information processing, the surge of Internet-based global collaboration networks, plus the development of electronic and biologic sciences have resulted in a wealth of high potential innovations that are starting to bear fruit (interactive television, wireless broadband connectivity and genomics are good examples).

We therefore seem to be facing an auspicious scenario. However, recent examples and the analysis of previous technological revolutions, show that expectations are not always realized. Innovations encounter pre existing cultures, practices and power structures (in business, political and bureaucratic spheres) which sometimes become threatened by the introduction of new technological paradigms. This resistance phenomenon could help explaining high failure rates in the deployment of new administrative information systems in organizations, even when they are expected to increase productivity. Resistance is also evident in the protectionist threats against off-shoring practices, a debated issue in the recent presidential elections in the USA. A similar phenomenon could explain why ICT is still not making a strong difference in students' learning even in places where the incorporation of technology to the classroom has been extensive.

However, there are also cases where results of the incorporation of technologies exceed expectations. This happens when technological revolutions trigger an accumulation of innovations, which attracts talent which in turn produces more innovations through a virtuous circle.

On these grounds, it is key to ask ourselves which are the challenges that governments are currently facing. In the first place, governments should contribute to eliminate, or at least diminish, the obstacles the introduction of the ICT paradigm is facing. However, governments can do more than that to help the change. Governments can become 'early adopters' of technology, showing their commitment to the introduction of technology and innovation. This is specially beneficial to encourage private investment. Government may also act as a facilitator helping to solve conflicts, or compensating those sectors that could be negatively affected by the changes.

In parallel, government has a big role of creating conditions to allow change to happen. Raising awareness and providing education for people are necessary conditions. It is also useful that entrepreneurs are encouraged to grasp new technologies to be able to modify them and produce new ones. Government also has to help creating the necessary flexibility in the public sector to allow change and innovation. An especially critical aspect in the regulation agenda is the telecommunications market.

From a government perspective, the coming years should be faced in a mood of serene optimism. A combination of alertness to be able to generate quick responses to opportunities together with a hard work disposition to be able to take the necessary actions to fully realize projects while overcoming the many obstacles that may appear.

ICT Revolution and its Impact on Chile's Strategic Agenda

Strategic Objectives: Growth, Equality and Democratization

In 1990, Chile recovered its democracy after 17 years of General Pinochet's dictatorship. A new center-left government called *Concertación de Partidos por la Democracia* came into office with a program having economic growth, social equality and the strengthening of democracy, as main priorities.

After three successive democratic governments, there is hardly any doubt regarding the success obtained for the goals set out. The Chilean economy has sustained a 5.5% average growth between 1990 and 2004, more than duplicating its per capita income. The percent-

age of population living below the poverty line dropped from 40% to 17% during the same period, without observing, however, substantial changes in income distribution (before transference). In the area of democratic consolidation, three presidential and four parliamentary elections have taken place since 1989 under completely normal conditions; several laws have corrected the authoritarian bias in the Constitution and the different powers of state operate without any major obstacles.

Current Situation

After the success of this period, the original strategic goals continue to dominate government's agenda. Nevertheless, and precisely as a result of the achievements and the changing world scenario, these challenges must be approached in a different way.

In the area of economic growth, if Chile wants to increase its current per capita income of close to US$10,000 (in PPP terms), to the levels of south European countries, it should sustain the 7% annual average growth rate witnessed during the 1990's (which decreased to a yearly average of 3,8% in the 2000-2004 period). Although Chile enjoys a high growth potential as reflected by the WEF Report on Global Competitiveness, which positions Chile in 22nd place among 102 countries, there is a growing national consensus that it is imperative to step up efforts in two deficit areas: education and technological innovation.

ICTs and their Impact on the Strategic Agenda

The inception of the Internet and the constellation of innovations that accompanies it have been perceived by the Chilean government as a great opportunity to advance in its strategic agenda. The potential of ICT to contribute to future tasks in Chile is very high. This does not mean that ICTs are granted an almost magical capability to produce development, but rather to be able to both allow technology to find its way in different sectors of society as well as to contribute to public policies that deal with the strategic agenda of the country.

Unlike those voices that emerge from both the ICT industry and non-governmental organizations that tend to either overestimate the technological potential or underestimate the obstacles to transform

the benefits of ICT in reality for citizens, the Government of Chile has sought to effectively integrate the contribution of ICT into the different public initiatives of its agenda. Hence we are skeptical of approaches where for example, the development of community info-centers in low income areas is viewed as the way to deal with poverty, or about those that argue that the sole availability of computers in classrooms will produce a leap in education quality. If the argument that explains the persistence of important areas of poverty emphasizes the need to overcome the disconnection of the poor from the economic circuits and public assistance networks, and accordingly a program of individual attention to those families is proposed to reestablish the link,[1] then ICTs are viewed as an element of co-assistance for that effort, in the shape of info-literacy programs or counting as information tools to support professionals working directly with such families. By the same token, it is perceived that the problems of quality of the Chilean education are explained by a combination of aspects, such as lack of infrastructure, curricular inadequacies, and deficiencies in teacher training. In this case Internet would have to be used to improve teacher training and lesson preparation,[2] and also included as part of the training program for students.

The future challenge, then, consists of determining how ICTs introduce threats, but especially how they open up opportunities, to create more growth, greater equality and growing democratization; in other words, how ICTs contribute to carrying out the strategic focal points of the agenda:

- An efficient State oriented to address citizens' needs

At this point, there is no doubt that the services sector is the one that has benefited the most from the advent of the Internet. And the main supplier of services in a country is Government. This has been thoroughly understood by the Chilean government, which has introduced Internet-based applications, especially those that strengthen the link with citizens, in an ample effort to modernize the public sector.

This has come to fruition. Recently, a United Nations report placed Chile as number 22 among 191 countries in the quality of its e-govern-

[1] Chilesolidario Program

[2] See educational website www.educarchile.cl

ment, surpassing many countries with a higher per capita income. This is the result of high-impact initiatives, such as on-line tax payments (today, more than 80% of tax returns are done through the Internet), issuance of Civil Registry certificates, and the launching of an online public procurement system called ChileCompra, among others.

Results obtained to date show high economic returns on these initiatives, a substantial improvement of relations between government agencies and the public and important stimulus to the extensive use of the Internet, especially among small and mid-size entrepreneurs. All of this leads to the conclusion that the agenda needs to be reinforced by updating those segments that have fallen behind—such as the health sector—advancing in the integration of front-office systems to back-office, and towards the inter-operability of systems among services.

- An economy integrated into the world

Chile opted, more than 25 years ago, to open up to world trade as a key element of its economic strategy. As a small country, its growth is crucially dependant on maintaining a high exporting dynamic. Although it is true there are no indications of exhausting export potential of the main sectors—mining, forestry, fresh fruit, salmon and wine—there is an emerging perception of more complex scenarios, stemming in part from the increasing international competition in these areas or from the emergence of innovations that reduce the relevance of the country's competitive advantages. From this perspective, it is essential to increase the national effort on Research and Development particularly with regards to the use of ICTs to boost competitiveness of the main national export sectors. ICTs can contribute to optimize the exports logistic chain, promote the integration between export companies and their suppliers, establishing efficient tracking systems and consolidating the prestige of the food exported by Chile in the phyto-sanitary area.

Simultaneously, it is necessary to persevere in the incorporation of Internet in small and mid-size companies, since the country's competitiveness not only depends on the efficiency of direct exports, but also on the whole production systems. Efforts to improve public services to companies (Customs, Internal Revenue Service, etc.) are also going in this same direction.

Finally, the fostering of new undertakings with perspectives of global escalation must not be overlooked. On this level, a potential opportunity lies on using the know-how developed by the export sectors.

- A highly dynamic service sector

It is worth mentioning the development of the export services sector, taking into account the huge transformation being experienced by this sector worldwide. Indeed, if estimations can be trusted regarding the fact that in the off-shoring field, no more than 5% of jobs that are potentially feasible, have been outsourced, the next few years will witness a massive demand for international services, which will overwhelm the capacity offered today by countries such as Ireland, India and the Philippines. In this scenario, Chile constitutes an interesting alternative for companies that are seeking to outsource services, owing to a combination of economic stability, a fluid and transparent business environment, a strong ICT infrastructure and access to qualified human resources. Based on this, several studies have positioned Chile in first place as an attractive country for off-shoring among Spanish-speaking countries. This opens up strong opportunities for the country and requires a precise strategy to focus efforts in terms of assuring substantial and sustainable benefits over time.

- An equitable nation

It is common knowledge that ICTs have brought a promise of prosperity to the world, but it also threatens to deepen inequalities, what some have dubbed as the "digital divide." A country such as Chile, which has quite a regressive income distribution—where 20% of higher incomes have access to 52% of the National Income[3]—is particularly exposed to this risk. Hence, all measures designed to confront the digital divide are essential. Fortunately, this was understood from very early on by the democratic governments after 1990 in their design of educational policies, when the Enlaces Program was incorporated as an essential part of the Improvement of Education Quality Program (MECE) destined to foster the formation of ICTs for all students attending public and subsidized schools in the country.

[3] Income distribution measured on Total Incomes, which includes social services and Government transfers.

But the digital divide has not yet been completely closed. It is necessary to continue with the efforts at school level and to extend them to other sectors of the population, an essential task for the upcoming years.

- A nation prepared for the future

Perhaps one of the most distinguishing elements of technological revolutions is the unpredictability of its course once it is triggered. Today, we can hardly predict all the innovations that will take place in the next 20 years in the ICTs field, and much less their social and economic applications and impacts. Facing this scenario, the country must be prepared, generating the conditions to allow to quickly adapt to new conditions. This implies, in a first place, the strengthening of technical competencies—not only in the engineering fields—required to comprehend the phenomena that will come and transform them into answers pertinent to national needs. In second place, it will be necessary to generate a capacity to adapt to the existing legal framework that makes viable the array of new technologies. Finally, it is essential that the government is capable of keeping abreast of new phenomena in addition to fostering regulatory frameworks that promote and not inhibit the innovative responses that the period requires.

The Digital Agenda

This section will outline the steps taken by the Chilean government to establish an agenda that gathered the various agencies involved in different aspects of consolidating an ICT strategy for government.

Pioneering Initiatives

There are three pioneering initiatives that constitute the decisive steps towards the introduction of ICTs in Chile and are milestones on which part of the Digital Agenda was based. These are: the regulation of the telecommunications sector; the ENLACES project in education and the introduction of the REUNA Network access to the Internet. A brief description of each one follows.

Deregulation of Telecommunications

At the end of the 1970's the telecommunications sector in Chile was formed by two state-owned companies: a fixed telephony provider on the national market (CTC) and one international long distance telephone operator (Entel), with both sharing the national long distance market. The State was the owner of two other regional fixed telephony companies (CNT and Telcoy) as well as the Post and Telegraph Company. The deregulation process started at the beginning of the 1980's, when fixed telephony licenses were granted to two new fixed telephony companies (CMET and Manquehue) in areas that were already serviced by the dominating operator. At the same time a mobile telephony license was granted to a company to operate in the capital city (Santiago).

During the 1980's Chile witnessed a wave of privatization of companies, including those in the telecommunications sector. The changes that occurred in this sector began with the passing of the General Law of Telecommunications in 1982. It established objective and non discriminatory technical criteria for granting licenses and assigning the number of operators in each market segment. This law defined standards of continuity and quality of service and the time periods for granting the services to the final users. Free price fixing was instated except for those public services of local and long distance fixed telephony where the antitrust agency determined conditions of insufficient competition.

Since its privatization, the telecommunication sector has experienced rapid growth; the telecommunication companies have increased their coverage of services, as well as their internal efficiency. Between 1987 and 2001, for example, the total number of fixed telephone lines in service multiplied six-fold, increasing the telephone density from 4,7 to 23,1 lines per 100 inhabitants.

Those services where regulatory changes introduced competition experienced a strong drop in their tariffs. Hence, after deregulating services in 1994, prices of long distance calls decreased close to 80%. The introduction of PCS mobile telephony in 1998, which increased the number of operators from two to four, together with the introduction of the "calling party pays" modality, reduced rates for the mobile service by approximately 50%. Fixed telephony rates—a serv-

ice that faced very little competition until recently—remained relatively stable during the 1990's, except during the last price fixing when rates were lowered substantially, especially in the access charges, which fell abruptly.

Similarly, and as a result of a decree that fixed rates of the incumbent fixed telephony provider, dial up connections to the Internet grew by more than 300% during 1999, and the connection cost was reduced by close to 50%. In terms of Internet connections, as of June 2004 Chile had close to 461,000 of dial up and 424,000 broadband connections to the Internet, showing an increase of more than 50% with respect to the previous year.

Chile has upheld a telecommunication policy that stimulates foreign investment, maintaining technological neutrality and favoring an early introduction of new services that diversify access options to telecommunication services. As a result of these factors, Chile exhibits outstanding access indicators to telecommunications services within Latin America and although the numbers are distant from those in the developed world, they are high in comparison with the country's GDP per capita.

Enlaces Network of Educational Informatics

The pilot program of Educational Informatics of the Improvement of Educational Quality Program (MECE) consisted in establishing an inter-school communications network through computers among students and teachers at elementary schools as well as professionals of other institutions related to education. One university became the central node and tutor of the appropriation process of the new technology (use of hardware and software in the educational context), and of the electronic communication culture in schools (use of electronic mail and forums to develop collaborative intra and inter-school work).

The Enlaces Network started up in 1992 with the goal, considered bold at the time, to have one hundred schools connected by 1997, with computer tools that were user-friendly, easy to use, multimedially and pedagogically stimulating, based on the technological conditions of telephone communication at the time in the country. The quick success of the program and the speed of technological transformations, changed the pilot nature of the program in 1994 when the gov-

ernment decided to extend the equipment, based on the population attending each school and new targets of network coverage. At present, the program covers over 90% of computer laboratories and has 75% Internet access in schools.

Thanks to this project, a network of schools was created which has had vast implications on the quality and equality of education across the country. It has placed at the disposal of the schools and high schools, a network and information technologies that open a window to knowledge and information of the world, drastically redefining the limits of what is possible to do and achieve at each school and making it possible to have access to the same resources of information and cultural interchange, regardless of social or geographical location.

The later incorporation of Internet access in schools, a process which is being completed today with broadband and connectivity for rural schools, has meant giving the educational institutions a central role in improving the digital literacy of the population through the current National Digital Literacy Campaign.

National University Network

In 1986, the national meeting of Academic Computer Centers of Chile, was discussing the architecture to be employed in the implementation of an academic network of electronic mail. This interest was echoed by a donation by IBM that allowed the installation of a transmission network of information that became Chile's first electronic mail network in 1987. This network connected five cities from north to south across the country. As time passed, demand grew for this service, which encouraged the installation of additional national and international connections that extended the scope and robustness of the network.

REUNA, the Spanish acronym for National University Network, was created as a consortium of 19 public and semi-public universities together with the National Science and Technological Council (CONICYT) with the purpose of operating this university network, which for some time was the only IP network with public access with national coverage and connected to Internet.

The increasing traffic needs and the limited access to a budget from the government to finance this growing initiative, quickly encouraged

REUNA to become a commercial operator offering Internet and other services. In retrospect, it can be said that the importance of this project was to be a solution that escalated over time and contributed to creating a demand for a new service such as Internet which today is considered a necessity.

Institutional development: from the Presidential Commission on ICT to the Committee of ICT Ministers

At the end of the 1990's, various actors of the Chilean society decided to tackle the challenges our country faced to make our entrance into the society of information. With this aim, by mid-1998, a commission representing all the relevant sectors of the country: government, parliament, civilians, the academic world and the Armed Forces, was formed to advise the President of the Republic. This commission convoked more than 100 experts to debate for more than seven months after which it generated a report of proposals, presented to and approved by the President of the Republic, Eduardo Frei in January 1999.

Fundamentally, the report defined a general view, diagnosing the readiness of the country to face the challenges, specifying the objectives and proposing a set of relevant initiatives. These initiatives included: to strengthen the Enlaces Program, consolidate REUNA, start up infocenters (community access), legislate on the electronic signature, regulate in order to reduce access costs, start up public procurement, and strengthen the state Intranet, etc.

The year 2000 was the year the digital policy was consolidated and the institutional development began. That year, the newly sworn-in President Ricardo Lagos, gave a huge impulse to digital issues. During his Address to the Nation on May 21, 2000, the President outlined his priorities for his six-year tenure of government and one of the highlights of his program was technological reform. In his speech, the President assumed, among others, the following commitments:

i) Start up a national network with access for the community (infocenters);

ii) Extend the Enlaces Network to 100% of schools in Chile;

iii) Promulgate a law permitting the accreditation and certification of the electronic signature and to provide a safe framework for electronic commerce to expand expeditiously;

iv) Initiate offers of public procurement on the network;

v) Place on-line most of the services and procedures the public sector provides;

vi) Generate an active risk capital industry.

Towards the end of the year, the President headed a public-private mission to Silicon Valley where to meet important leaders of the ICT world, and some cooperation agreements were signed.

In order to conduct the ICT issues, because it is a transversal nature, the President ordered the creation of the Committee of Information and Communication Technologies Ministers, which was instated in June, 2000.

The Committee of Information and Communication Technologies Ministers was constituted with the goal to facilitate government coordination for the elaboration and carrying out of the follow-up of ICT policies. This Committee was entrusted with proposing policies and stimulating initiatives for the development of information development, the stimulation of e-commerce, the promotion of the industry of contents, the expansion of Internet access, to accelerate the social learning process associated with the use of the networks, as well as for the digital diffusion of culture and education. The Committee of Ministers organized its activity in five areas: Expansion of Access; Formation of Human Resources; E-Government; Companies; and Legal Framework, and defined the coordinating leaders for each one of them. The Committee set out to achieve the following proposals: constitute the National Network of Infocenters; design and stimulate the digital literacy campaign; complete the informational phase and start up the transactional phase of e-government; develop a suitable Legal Framework, especially the electronic signature law.

Digital Agenda: Objectives and Components

In order to give new stimulus to the digital issues, at the end of March 2003 the President appointed the under-secretary of Economy as Government Coordinator of Information and Communication

Technologies (ICTs) with the goal of designing a Digital Agenda, together with the private sector and academia, to be presented to the President for approval.

In April, the Digital Action Group (GAD), the name chosen by this private-public committee, was constituted. Its members represent the business world; foundation directors associated with the issue; members of parliament; academics and experts and public authorities from the ministries of Education, of Transport and Telecommunications, of Finance and of the General Secretary of the Presidency.

From May to June 2003, the GAD identified the areas to be contained in the digital agenda. The six areas to be worked on were defined as: Access and Quality; E-Government; Formation of Human Resources; Companies, ICT Industry; and the Legal Regulations framework.

Subsequently, between the months of July to October, the GAD focused on the elaboration of its proposals. To this end, several work teams were created, both public and private. More than 80 people participated in the private groups while the public groups mobilized more than 85 directors and professionals. At the beginning of November, the private and public groups joined their efforts to prioritize and propose a definite series of activities that constituted the Digital Agenda. This activity culminated successfully at the beginning of January 2004 with a proposal for the agenda that was approved by all the members of the Digital Action Group.

As a result a Digital Agenda was elaborated incorporating the following challenges (quoted from the original text of the Agenda):

Widely Available Access

There is no doubt that the country now faces the difficult phase of expanding connectivity. If current economic trends continue, Internet penetration will continue its expansion rate through 2006. However, considering that income distribution will not likely change in the short term, 70% of this growth will take place among the highest income quintile, and only this quintile will reach the level of developed countries. Among the five lowest income deciles, connectivity at home has not yet surpassed 10%.

Broadband growth has been significant, but without a major reduction in access costs—whose average in 2003 was US$55—the growth rate may drastically slow beginning in 2006, especially in homes and microenterprises.

Given this situation, the challenge is to maintain the rate of progress made in providing widely available and increasingly better access by designing a strategy that overcomes obstacles like unequal income distribution, restrictions facing micro and small businesses, and connectivity problems in rural areas and remote regions like Aysén and Magallanes.

The situation is favorable. Three factors will facilitate Internet expansion over the coming years. First, economic growth will be greater than during the 2000–2003 period, and this will provoke an increase in demand. Second, equipment and access costs will undergo a sustained reduction. Third, community broadband access at schools, Infocenters, and cybercafes will expand. This will be particularly important for the poorer half of Chile's population, who do not yet receive the income needed to have a computer at home, let alone an Internet connection.

But it is possible and necessary to do much more. The private sector should develop commercial packages of computers with Internet connections for lower income homes and microenterprises. The Government will mainly subsidize remote and rural areas, low-income communities, and microenterprises. Finally, the Government should expand and consolidate its broadband digital networks, giving special priority to access to public services in regions and towns, including educational and health care establishments.

Education and Training

Enlaces Program and other technical training networks should implement broadband Internet access. The challenges, however, go deeper than just connectivity. The biggest challenge is to expand and intensify full integration of digital technologies as a learning resource for the curriculum and their use in the classroom. This is where investment in digital content, advanced teacher training, and the spread of better practices all constitute fundamental focal points for development.

Even though Chile's educational system has made significant progress and has developed a reform program that the Organization for Economic Cooperation and Development (OECD) described as one of the most ambitious in Latin America, it is not yet in conditions to guarantee the development and equity that this country needs. Its potential is inhibited by the lack of schools that are effectively able to compensate for the inequalities among its students, which are based on social and family background.

There are also deficits in the quality of training systems—particularly for workers with the highest qualifications. In the area of higher learning, there are very few high-quality graduate and diploma programs

In the end, all of these factors limit the country's competitiveness both in the long term and over the next decade. In fact, 75% of the workforce in 2014 will be made up of people who are working or looking for work today. In a decade of accelerated technical change, investment in education and training of current generations of workers is an extraordinarily important imperative.

Online Government (Deficiencies)

Unequal development of electronic government. The gap between the substantial progress of some Central Government services and the delays observed in Local Government is evident. In fact, 320 municipalities out of a total of 341 are connected to Internet and, of these, only a little more than 40% have dedicated access. There have also been serious problems in implementing advances in digital technology use in the health-related public sector. Furthermore, achievements obtained by Government Administration contrast with those of the Legislative and Judicial powers.

Scant capacity and coverage of the Government digital network. Although it has been possible to develop a Government Intranet that connects a little more than 27,000 work stations in the 27 public agencies, this network unquestionably has neither the capacity nor the coverage to comprehend the growing needs of the public sector as a whole.

Insufficient development in digital technology use for an integrated back office. A good part of the government's digital technology efforts has been concentrated on front office developments to assist users and

citizens. Except for some important public entities, most public services are only recently introducing back office changes, that is, in management and organization. This weak point becomes clear when it comes to inter-service coordination. Herein lies the main challenge for public administration and the intelligent application of ICT.

Digital security of the public sector. The public sector rests on a complex network of information infrastructure that, as a result of growing interconnectivity, is vulnerable to threats in growing numbers and varieties. The effective protection of this essential infrastructure in the public sector requires determining a digital infrastructure security strategy, with the purpose of lessening vulnerability, mitigating damages, speeding up recovery times in the event of glitches or malicious activities, and being able to identify the causes and/or sources of these activities for analysis and/or research.

Digital Development for Businesses

In 2003, nearly 100% of large and medium-sized firms, as well as 40% of small businesses, were connected to Internet, with the presence of broadband connectivity on the rise. Nevertheless, significant shortcomings continue with regard to more advanced ICT use. Companies use Internet to stay informed about what the public sector is doing and to check the status of their bank accounts and deposits, but they carry out few transactions aside from some basic services that are widely available on the Internet. Only 15% of businesses communicate with their suppliers and clients over the Internet, and only 25% of that number own a website. These figures are not good if we compare them with developed countries, which conduct three to four times more buying and selling transactions online.

The main hurdles perceived by entrepreneurs and managers against adopting digital technologies are unfamiliarity, unawareness of their relevance, insecurity and distrust, communications problems with the people in charge of information systems, complexity, and cost. Ultimately, many entrepreneurs still see no return on investment in advanced ICT uses. However, those who have implemented these solutions have a favorable view: 66% consider that it increased efficiency, 57% find that it increased productivity, and 49% declare to have obtained cost reductions.

The spread of information and communications technologies in businesses has thus far had two big advocates: the public sector and banking. It is likely that they will continue to be the main vectors of massive expansion in the 2004–2006 period. However, the debut of the private and public marketplace (for example, ChileCompra) should spur the growing use of e-trade in production chains. The widespread company use of electronic invoices will also contribute to this.

Take-off of the ICT Industry

In Chile, the information and communications technologies industry is in its infancy—without the exception of telecommunications—and it is mostly made up of small and medium-sized businesses that are not very consolidated. The digital content business is recently emerging; hardware is small; and software is grappling with major challenges. Furthermore, one of the key factors for the ICT industry's take-off—namely, the virtuous circuit among companies, universities, and research centers—has not been present in the Chilean case.

Equally, there are standards and quality certification for products and services worldwide, geared at guaranteeing homogeneity and satisfaction among global clients. Only a few local ITC firms, however, have incorporated these practices to date.

Legal Framework

The building of the legal-regulatory framework for the information society took its first step with the approval of the Electronic Document and Electronic Signature Law. Unlike other Latin American countries, Chile was able to develop an application with a quick and massive impact: the electronic invoice, and now electronic public purchasing. Moreover, in the 1990s, Chile approved the Computer Crimes Law and the Privacy Protection Law, which are important pieces of legal development that the country requires.

The initiatives that should be promoted in the area will be geared toward removing limitations in the legal system in order to provide the appropriate institutional framework for backing and fostering the development of electronic trade, electronic government, and the use of information and communications technologies. Furthermore, people should be given enough security so as to enhance their trust in the operation of electronic platforms.

These challenges were incorporated into an agenda of 34 initiatives shown in the following table.

Table 17.1 Digital Agenda: 34 Initiatives (2004–2006)

Access
1. Consolidation of the means that will facilitate individual and community broadband access for all Chileans.18) Widespread use of electronic invoices.
2. Promotion of the development of Infocenters as service centers.19) Consolidation and expansion of the use of ChileCompra.
3. 900,000 homes and 150,000 businesses connected to Internet by 2006.20) Simplification and online installation of business transactions.
Education and Training
4. Digital literacy for half a million Chileans.
5. Launching of the certification of ICT skills.
6. Promotion of connected and equipped schools.
7. Integration of ICT into curricula.
8. Fostering of technical/professional ICT training.
9. Promotion of world-class content.
10. Command of basic and instrumental English for all schools.
On-Line Government
11. Integrated Platform of electronic services.
12. Broadband digital network for the public sector (Route 5D).
13. Electronic platform for Chile Solidario and social policies.
14. Development of digital technologies in the health sector.
15) Digital development of regional governments and municipalities.
16. Increment in the metrics and efficiency of government information technology spending.
17. Improvement of the security of essential information structures for the public sector.
Digital Development for Businesses
18. Widespread use of electronic invoices.
19. Consolidation and expansion of the use of ChileCompra.
20. Simplification and online installation of business transaction.

21. Electronic billing for fees and online initiation of activities.

22. Development of means of payment for e-trade and consolidation of Payments Portal of the Government.

23. One Stop Shop and foreign trade marketplace.

24. Increased adaptation of Development Instruments.

Take-Off of the ICT Industry

25. Identification of opportunities and focusing of efforts for the development of the ICT industry.

26. Quality assurance through company certification.

27. Intensification of the High-Tech Foreign Investment Attraction program.

28. Heightened promotion of ICT research and development (R&D).

29. Expediting of the ICT industry export process.

30. Financing for creation and start-up.

Legal Framework

31. Elimination of obstacles and promotion of electronic document and electronic signature use.

32. Right of execution of electronic invoicing.

33. E-trade consumer rights.

34. Updating of legislation for protecting intellectual property.

The Agenda was publicly launched by the President in March 2004. The Digital Action Group was mandated to oversee the development and completion of each initiative.

Current Situation: Main Achievements

By the end of 2004, the balance of the digital policy is relatively positive, as is shown by the following aspects:

- There is a Digital Agenda agreed upon between the private and public sector, which is fostered and monitored by the Digital Action Group. This group includes sectors, both public and private, that are coordinated at the operative level. All of this allows institutional recognition and validation to foster and monitor the Digital Agenda.

- There is an Action Plan 2004-2006 with 34 initiatives and 67 activities, the majority of them funded and having defined leadership. This constitutes a guideline for action, an instrument that gives direction, setting goals and establishing evaluation criteria.

- Main results are the following:

a) **Access.** There is National Network of infocenters in place with more than 800 access points across the country which are being transformed from purely access points into service centers, where people can do useful things that simplify their life, such as transactions with government.

b) **E-Government.** An informational phase of E-Government is nearly finished (300 web sites) and a second, more transactional phase has been initiated. Currently, there are more than 200 transactions on-line, many of them having on-line payment. This year, on-line transactions at the municipal level will be initiated.

c) **Human Resources formation.** Government has focused on a digital literacy campaign to comply with a target of certifying 500,000 adults by end of 2005. To date, over 400,000 have received formation in 18-hour courses.

d) **Companies.** A great effort has been made to simplify over 50 out of 80 transactions, identified by businesspeople, and to move them on-line to facilitate their relation with government. With regard to ICT companies, a certification program has been started, whose first results will be observed during 2005.

e) **Legal and Regulatory Framework.** A law and regulation for electronic signature have been passed, three certification companies have been accredited. Moreover, rules and standards on electronic document and interoperability have been published.

Summary and Future Challenges

Major challenges will be involved in the fulfillment of Chile's Digital Agenda in future years. At present there are a number of public and private organizations contributing their effort and enthusiasm to complete the 34 initiatives contained in that Agenda, a task that of

course demands important public funds in a country characterized by its fiscal austerity.

However, as this undertaking unfolds, new challenges arise, derived from the innovative dynamics of the ICT sector as such, but also from the clash between innovation opportunities and the "traditional ways of doing things."

Despite important advances, the most important challenge probably still lies in the Human Capital field. Although Chile has made an important effort to provide Internet access to schools, future tasks should also concentrate on improving education quality, in order for it to really make a difference in students' learning. The global nature of this challenge should be also recognized, at a time when not many substantial international collaboration efforts can be encountered. These are needed for best practice transference but also to increase the availability of research resources. In this same direction, the current production of educational content to be put in the Web is not sufficient, especially in Spanish language. As a contribution in this field, efforts associated to the expansion of the EducarChile network to other Latin American countries could be made.

The internationalization of services, unleashed by the arrival of the Internet, calls for a major change in the training of professionals and technicians, as their job opportunities increasingly involve serving geographically distant customers. Substantive curriculum adaptations are needed for careers typically conceived to deal mainly with local markets. Efforts aimed at increasing the flexibility of education modalities and the dynamism of educational institutions themselves are also needed. So far, traditional educational institutions have been rather slow in embracing these trends.

Enterprises in the field of services in general and ICT companies in particular are also being challenged by internationalization. Although Chile embraced open international trade very early on, enterprises in the field of services were initially not greatly affected by it, since they could still rely on some proximity advantages. At present however, they are feeling the first signs of that economic openness, which will compel them to adopt drastic modifications in their competition strategies. Quality assurance, compliance with widely adopted certification standards and international partnership building, among oth-

ers, will become key factors for that new survival strategy. On the public side, policies should take bold steps to accompany and strengthen this competition process.

There is still a huge potential for public value generation associated to e-Government in Chile. To date, efforts have concentrated on the front-office field, which has produced important improvements in the relationship of citizens and government. However, there is still a long way to walk in the application of ICT to back-office processes, which despite meaning potentially high productivity gains, face major implementation obstacles. In part, these obstacles arise from the complexity of process re-engineering that is required, but they also stem from rigidities in labor regulations associated to the public sector. Measures also have to be taken so that public organizations can benefit from the opportunities that lie in the use of outsourcing mechanisms.

Another emergent challenge has to do with the governance of the e-Government Agenda. This entails finding an adequate equilibrium among stimulating innovation on public executives that are concerned with maximizing public value for their agencies, together with the search of economies based on demand consolidation, systems integration and standardization. Present practice has favored stimulating innovation at the agency level, a factor that has been key to various success stories within government. However, some important opportunities for consolidation and standardization are still waiting to be exploited. The establishment of the Digital Agenda, the assignment of a Governmental Coordinator for ICT and the constitution of a coordinating instance for e-Government initiatives are measures aimed at a better articulation of public efforts. However, this organization still bears a temporary character that should be consolidated into a more permanent form.

From this discussion it is very clear that the challenges ahead are not of a minor nature. In parallel, it is hoped that the technological revolution maintains its pace, producing more opportunities for citizens' benefit, which in turn faces us with the need of structuring a balanced set of initiatives, under constant revision, that at the same time rates the contribution of ICT in a fair measure. To make this happen, it is essential to bear in mind that ICT is a set of instruments to materialize a national strategy, which for Chile means: growth, equality and the deepening of democracy.