Public policies for the development of information societies in Latin America and the Caribbean

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Summary

This document analyses the challenges facing Governments of Latin America and the Caribbean in terms of the policies they will need to adopt in order to transform their countries into information societies. The State is concerned by the change in paradigm caused by the introduction and massive use of information and communications technologies (ICTs) for two reasons. On the one hand, the public sector can be an important actor in orienting the society towards a new model of social and productive organization based on processes and intensive digital information and communication flows. In order to seize the opportunities for economic growth arising from ICTs, reduce new forms of inequality and achieve greater social inclusion, public intervention strategies that complement or correct market performance must be developed, implemented and assessed. On the other hand, the public sector, in digitizing its processes, changes its mode of functioning and the way it fulfils its mission, at the same time as it encourages the rest of society to adopt new forms of interaction. Thus, the State can use ICTs as a tool to effect efficient and transparent change and do so in the service of democracy.

These two dimensions of the relationship between the State and ICTs –the promotion of information societies based on an approach that combines **economic growth with equity** and the transformation of the State, itself, in the quest for greater **transparency and efficiency**– give rise to political agendas that can be integrated into a regional agenda. Given that the vast majority of countries in the region are already implementing some type of action in this regard, this document demonstrates how the **regional integration** of agendas for information societies can be a powerful instrument for promoting economic growth with equity.

This document presents the challenges of a public policy agenda, that is, it approaches the issue from the point of view of State action. Thus, it does not take into account other dimensions, such as the business and investment strategies of private enterprises and civil society initiatives, which will have a substantial impact on the path leading to the information societies.

Introduction

The paths leading to information societies are diverse and depend on the objectives of each country.[1] As stated in the Declaration of Principles of the World Summit on the Information Society (WSIS), the international community is seeking to build a people-and community-centred, inclusive, development-oriented society.[2] In this society, all will be able to create, consult, use and share information and knowledge, thus enabling individuals, communities and nations to use their full potential to promote sustainable development and improve their quality of life. The new media available for creating, disseminating and processing information through networks and information and communication technologies (ICTs) open up this possibility.

The transition towards information societies based on the use of ICTs implies opportunities but is also fraught with threats, hence the importance of establishing public policies that ensure socially desirable results. ECLAC maintains that digitization of information flows and communication processes can, with an appropriate public policy agenda, contribute to a regional agenda for growth with equity.[3] In other words, ICTs can and must be used as tools for improving

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1 An information society is a system of economic and social networks that use digital technologies to produce, store and exchange information rapidly and at low cost, compared with the past, and which have a decisive impact on the economic, political, social and cultural spheres (see Bangemann Report, 1994). The present document considers that an information society can take on different forms based on institutional determinants and different national and regional contexts, which is why, strictly speaking, one should speak of information *societies* in the plural. Thus, the countries of Latin America and the Caribbean are in the process of becoming information societies but at different rates and with varying degrees of intensity.

2 ECLAC (2003a) states that the "principal focus of the development of an information society should be the individual and the community".

3 In recent years, increasing evidence has been accumulated on the positive impact of ICTs on growth. In other studies, which are quoted further on in the document, Chen and Dahlman (2004, pp.1 and 41) analyse the impact of knowledge on economic development and conclude that "...when the ICT infrastructure, measured by the number of phones per 1,000 persons, is increased by 20%, we find that the annual economic growth tends to increase by 0.11 percentage point." Thus, "...the level of ICT infrastructure is important in explaining differences in long-term economic growth rates." Evidence of the impact of ICTs on equity is far from precise and is an issue that calls for further research.

social inclusion and cohesion, increasing the transparency and efficiency of productive organization and public institutions and strengthening regional cooperation and integration.

The spread of ICTs in Latin America and the Caribbean over the past five years has been remarkable and has had a growing impact on the public sector, the economy, society, culture and linkages with the global economy. It is increasingly accepted that these technologies have opened up opportunities and provided tools for promoting, development, well-being, integration and democracy. The social perception that such opportunities exist has led to the convergence of individual aspirations, corporate strategies and government policies. The region, however, is also conscious of the fact that if these new technologies are left unbridled and unregulated and if no effort is made to intervene in markets to ensure access for all, the result will be concentration of income and power (Soete, 2003).

The region is being presented with a historic opportunity to implement public and private initiatives which can serve to further regional projects, promote the harmonization of standards and rules and foster technical cooperation among countries with a view to using ICTs for development and equity. Almost all the countries of Latin America and the Caribbean have implemented public policies based on cooperation between public and private sectors and civil society and designed to convert these new technologies and digital networks into tools for economic and social development, combine more competitiveness with greater opportunities for all and enhance State transparency and efficiency. Coordination of public policies, corporate strategies and civil society initiatives are vital in a field as vast and complex as that of building information societies.

The initial outcomes of this cooperation have already emerged. The region has launched a series of mass impact projects which attest to the fact that it is taking advantage, if only partially, of the digital opportunity. The accumulation of initiatives that support the development of more competitive enterprises, more efficient and transparent institutions, more information and social communication and more direct links with the rest of the world has convinced public policy-makers of the need to intensify the use of ICTs in public policies and in State management. In some countries in the region, the digital agenda is increasingly an integral part of the development agenda. Such initiatives are becoming more widespread and more intensively used in Latin America and the Caribbean as a whole; thus, all countries have agreed to reduce their domestic digital divide as well as the gap between them and the developed countries by 2015, the date set for achievement of the Millennium Development Goals.

The countries in the region have made important strides but still need to coordinate fully the new technological paradigm with their development strategies by adopting comprehensive and efficient public policies and by furthering regional cooperation (Pérez, 1989, and Cimoli and Dosi, 1995). The challenge in the short term is to move rapidly from agreements and political declarations to action, since there is consensus on the importance and relevance of using ICTs. The host of political declarations made in the last five years attest to this fact;[4] the challenge now is to prioritize objectives, identify instruments and appropriate rules and promote concrete initiatives and projects.[5]

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[4] The Declaration of Florianópolis (July 2000), the Itacuruça Declaration (October 2000), Proposal by the Rio Group for the integration of Latin America into the information society (March 2001), Rio de Janeiro Declaration on ICTs for Development (June 2001), Agenda for Connectivity in the Americas and the Plan of Action of Quito (August 2002), First Meeting of the United Nations Information and Communication Technologies Task Force, Latin American and Caribbean Regional Network (LACNET) (February 2002), Bávaro Declaration (January 2003).

[5] As stated by the United Nations Secretary-General, Kofi Annan, "The theme of this year's World Telecommunication Day, "Creating an Equitable Information Society: Time for Action", calls on us to give shape to the vision adopted at the first phase of the World Summit on the Information Society". ECLAC, Press communiqué, 17 May 2005.

The region is facing a double challenge: reducing the lag or divide with respect to the developed world and ensuring that this does not mean higher income concentration and a greater information asymmetry between citizens and the State. This document recognizes the opportunities opened up for Latin America and the Caribbean and examines the public policy elements needed in order to use the digital technologies and networks to promote economic development with equity. This is being done at a time when the countries in the region are preparing for the second phase of the World Summit on the Information Society, scheduled to be held in Tunis in November 2005.[6] The timing is right because a number of common objectives have been identified, which, during the preparations for this phase may emerge as a regional agenda for action that will enable the region to move forward towards the targets set for 2015 by the international community.

The document focuses attention on public policies for expanding access, building capacities and increasing the efficiency and transparency of the State. For this reason, certain other dimensions that are equally important for the development of information societies are not taken into consideration or given due attention. These include market structure and patterns of competition and corporate competitiveness associated with the different economic activities, and the contribution of actors such as non-governmental organizations.

[6] The General Assembly of the United Nations adopted a decision to hold the World Summit on the Information Society in two phases. The first was held in Geneva from 10 to 12 December 2003 and the second will be held in Tunis from 16 to 18 November 2005. The Summit, which will bring together heads of State and Government and other high-profile world leaders, seeks to place high on the global agenda problems such as poverty, environmental degradation and the development of the information society.

Frame of reference

The issue of the information society is a cross-cutting and generic issue which is analysed and rationalized in this working document on the basis of a frame of reference that recognizes the following characteristics of the new technological paradigm.

I. The products in question, **information and knowledge**, are akin to **public goods**,[7] with the problems that this implies in terms of guaranteeing an efficient private supply.

II. **Complementarity**. The *output* of this activity is the *joint* result of three technological trajectories (*hardware*, network infrastructure and generic *software* and application services).[8] This *output* is the result of productive processes which generally present *economies of scale, sphere, network* and *density*,[9] variables that tend to lead to the suboptimum operation of markets.

III. **Uncertainty**. Each trajectory in itself is uncertain, in terms of both results and deadlines. The combination of three trajectories with these characteristics forms a particularly uncertain and complex system; practically no country will have a complete matrix that includes them fully.

IV. **Lock-in and switching costs.** Once a technology or trajectory has been chosen, the switching costs can be very high owing to the use of durable complementary assets.

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[7] The separation between public and private goods based on characteristics of rivalry and exclusion, depends not only on their intrinsic nature, but also on the legal, technological and cultural environment.

[8] This is the convergence between the trajectories of Tapscott's three Cs of the digital economy (Tapscott, 1996): "This industry is developing as a result of the convergence of three more traditional sectors: communications (telephony, cable, satellite, wireless), computing (computers, software, services), and content (publishing, entertainment, information providers)."

[9] *Economies of scale* derive from investments sunk in access networks (high cost of installation and low marginal operating cost). *Network economies* imply that when the size of a network increases, its value for users increases more than proportionally. *Scope economies* emerge in situations of joint production. *Density economies* are the result of the decrease in costs per line or unit of traffic associated with a switching location. Economies of scale are usually regulated using maximum rates, network economies, by fixing, or making firms negotiate, interface prices (access fees), and density economies, through rate averages per geographic area, which involve cross-subsidies.

The switching costs themselves have a bearing on technological trajectories and strategies.

V. **Convergence.** Digitization of the different contents (voice, text, images, etc.) allow for the convergence and interchangeable use of a single network.[10] This use is translated into a reduction of the impact of some fixed costs (for example, the costs associated with dedicated networks), whose presence could lead to natural monopolies. However, a distinction must be made between the elimination of fixed costs for the use of networks by a service provider, assuming that the regulatory framework is given, and the fact that these costs still remain for the system as a whole (it will always be necessary to cover the high costs of installing access networks).[11] Thus, ICTs do not eliminate indivisibilities and their effects on market structures.

VI. **Exogeneity of technological trajectories.** For many of the countries in the region, the trajectories in question are determined outside of their systems of innovation and should be taken for granted.

VII. **Institutional, political and regulatory endogeneity.** Even when facing exogenous technological trajectories, countries have degrees of freedom –which vary according to their degree of development, size, etc.– in selecting alternatives and combinations of public policies and more or less efficient market and institutional structures. The very complexity and uncertainty of the system opens up these alternatives.

These elements define the complex context of the new technological paradigm and show that, in adopting public policies geared to promote information societies, it would be a mistake to work with unidimensional and linear visions (Freeman and Louçã, 2001, Dosi, Orsenigo and Sylos-Labini, 2002). In view of these difficulties in the frame of reference with which the present document is organized, five sets of variables have been incorporated that should be taken into consideration for the design of policies in this field:

- **Technical infrastructure**, which permits physical access by users.
- **Capacities and knowledge** codified and transmitted in standards.
- Public **contents and applications**.
- **Instruments**, which include incentives and regulation.
- **Strategic guidelines** and their policy implications.

Access to ICT infrastructure is a prerequisite for harnessing information and knowledge on contemporary societies. An uneven and discriminative pattern of access, also referred to as the digital divide, leads to a new form of inequality within and between societies, with adverse effects on development. But, building equitable information societies requires more than the guarantee of universal access. People need **skills** if they are to harness technology and convert access to information into the **creation of knowledge.** These skills include basic reading and writing, language skills, skills in use of technology and the creation of efficient ways of processing and disseminating information using digital tools.

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[10] The concept of content includes anything that may be digitized, that is, information transmitted through alphanumeric and non-alphanumeric codes (colours, forms, sounds, etc.).

[11] The fact that it is impossible to exclude or eliminate free-riders by changing the regulatory framework can mean that the installation of a network has, at least to some extent, the characteristics of a public good.

Technology digitizes contents, information flows and communications in different spheres of society. In transforming its own processes and services, the public sector has a leading role to play in digitization, since the **content generated by the public services** are extensively used by Internet users in many countries in the region. Intensive ICT use in State functions, the development of electronic government and the actions of public policy in education, health and social security lead to the dissemination of ICTs in the economy and society.

When services akin to public goods are handled by the private sector in conditions of high concentration, **regulatory frameworks** that lead to efficient markets must be designed and set up. Institutional failures that hinder the coordination of actions for the development of ICTs call for **coordination mechanisms** that provide frameworks for coordinating efforts, developing synergy, monitoring processes and evaluating the impact of policies as well **legal rules** that provide trust and security to digital behaviour.

In several countries of the region, these mechanisms are grouped in "connectivity agendas", "e-strategies" or "digital plans of action". But while the World Summit on the Information Society seeks to identify ways of coordinating actions to face these challenges at the global level, Latin America and the Caribbean still lack a regional coordination framework, notwithstanding the significant potential that the adoption of a common agenda will imply in terms of strengthening integration.

Infrastructure and access

Access to ICTs

The Governments of the region consider that universal access to ICTs will give a powerful boost to development and equity; but also recognize the wide digital divide that exists with respect to developed countries, as well as within each country. These divides are the result of economic, territorial, social and cultural inequalities, which, in turn, they only serve to exacerbate further.

There are three requirements for full access to ICTs. The first is **physical access**, a dimension in which there is a clear difference between urban centres and rural areas in the region. The second is **economic access**, that is, the availability of financial resources so that people from different income levels can connect to the Web, covering the cost of the connection, which includes the costs of telecommunications, Internet access and the ICT terminal (personal computer, cell phone, etc.). A third dimension of the digital divide, which is analysed in the section on "skills and knowledge" relates to **socio-cultural access**, bearing in mind the evidence that the level of education, ethnic origin, gender and age influence patterns of access;[12] for example, for a given geographic location and level of income, young people tend to use ICTs more frequently and effectively than older persons.[13]

In 2000-2003, the countries of Latin America and the Caribbean reduced the gap with respect to the developed countries although it still remains wide. More success was achieved in bridging the divide in the case of mobile telephony (see table 1). In terms of access to fixed telephony and the Internet, the highest income group of the population of the region is fast approaching the levels of the developed countries, so that regional averages improved significantly.

The digital divide is related to the difference in per capita income between rich and poor countries. Most ICT equipment are tradable goods that are marketed in global markets at prices

[12] For a discussion on the different dimensions of the digital divide, see ECLAC (2003a, pp. 23-24).

[13] In Colombia, the average age is 33 years; the average age of a television user is 33.7 years; of a computer user: 25.2 years; and of an Internet user: 24.3 years. See Observatory for the Information Society in Latin America and the Caribbean (ECLAC, 2005b, p. 38).

TABLE 1
INDICATORS OF THE DIGITAL DIVIDE EXISTING BETWEEN LATIN AMERICA AND THE CARIBBEAN AND THE ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (OECD)

	Ratio L. America and Caribbean/OECD	
Name of the indicator	**1998**	**2004**
Fixed telephones per 100 inhabitants	0.20	0.30
Mobile telephones per 100 inhabitants	0.16	0.45
Internet users per 10,000 inhabitants	0.07	0.28
Internet users/Fixed telephones	0.32	0.90

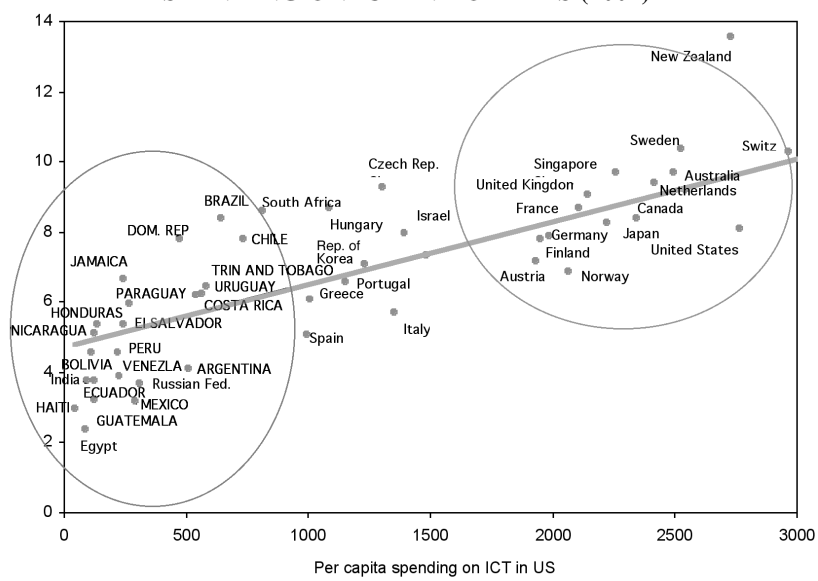
Source: International Telecommunications Union (ITU), *World Telecommunications Database, 2004*.

N.B.: The table shows the ratio between the value of the indicator in Latin America and the Caribbean and its value in OECD countries. A value of 1 means that there is no gap between the two regions, values below 1 indicate a gap betwen Latin America and the Caribbean with respect to the OECD countries, and viceversa for values greater than 1. When a value increases (decreases) it indicates that the gap diminishes (widens).

that are basically comparable;[14] all countries should spend the same amount per capita to achieve equal rates of access. But in Latin America and the Caribbean, where per capita income is in the region of US$ 3,300, spending US$ 2,500 per capita on ICT (a similar amount to what is being spent in developed countries) would mean allocating 75% of income to this item.

Many developing countries treat ICT as a priority and spend amounts which, in GDP terms, are close to, or even higher than, the world average: 8.4% in Brazil and 7.8% in Chile and the Dominican Republic. However, in absolute terms, this is far below the amount spent by the developed countries. Thus, the countries of Latin America and the Caribbean spend close to US$ 400 per capita per year on ICT, while the figure for the developed countries is about six times as high (see figure 1)

FIGURE 1
SPENDING ON ICT AS A PERCENTAGE OF GDP (2000) AND PER CAPITA SPENDING ON ICT IN DOLLARS (2001)



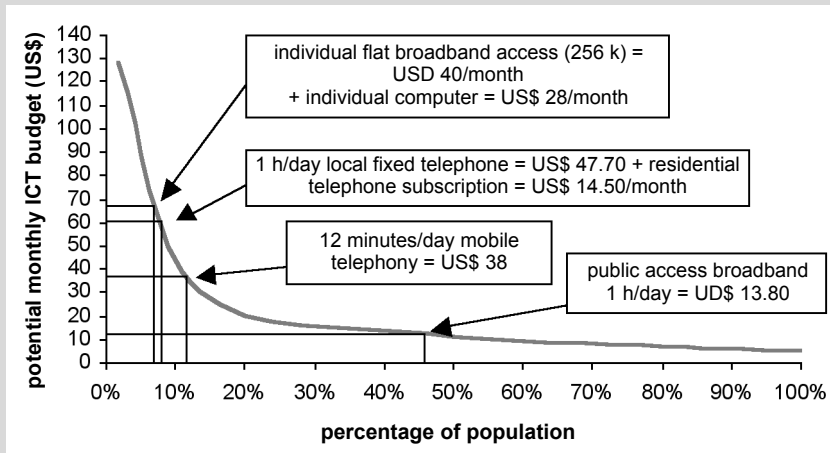
Source: World Bank, *World Development Indicators, 2002*, cited in World Bank, *The Global Information Technology Report; readiness for the Networked World*, Washington, D.C., Oxford University Press, 2002. World Bank. Sample of 82 countries.

[14] In fact, the prices of this kind of equipment are higher in Latin America and the Caribbean than in the developed countries. For example, the price of a Sony Vaio PCG laptop, with an Intel Pentium 4 processor,

According to information supplied by the International Telecommunication Union, telephone rates in the region are relatively low when compared with international rates (ITU, 2004). In spite of this, the low per capita income and its poor distribution have an adverse effect on the new services as may be noted in the case of Peru in box 1. Given the income level in this region, it is unrealistic to expect that the digital divide can be bridged in the short or medium term based on the pattern of connection of the developed world.[15] This indicates that the "easy" ICT expansion phase in Latin America and the Caribbean could be coming to an end.

BOX 1
INCOME DISTRIBUTION AND ACCESS TO ICT IN PERU

The telecommunications regulator in Peru estimates that 3.6% of monthly income is spent on ICTs and that this percentage is stable between income groups. This should mean that the richest 2% of the society has on average US$ 127 to spend monthly on ICTs (US$ 1,524 per year, that is, more than in Spain, Portugal and Italy), while the poorest 20% would have only US$ 4.8 (58 dollars per year). Assuming that a very basic computer costs US$ 1,000 and is used for 36 months (28 dollars per month), to which must be added the monthly fee of US$ 40 for broad-band access, then only 7% of the population could afford 256 kbps Internet access. Ensuring that half of Peruvians have individual access to broadband, as the Governments pledged in the Plan of Action of the World Summit on the Information Society, would require bringing the price of this package down to US$ 10. The further down the income distribution scale, the sharper the fall in income levels, so that it is difficult to imagine that the free market will ever reduce the prices of technology so substantially, at least not in the short term.



The ICT with the highest penetration is cell telephony, with 11 users per 100 inhabitants in 2003. According to the data presented in the figure below and market prices for this year, a user could buy a maximum of 12 minutes of cell phone use per day, assuming that all his/her ICT expenses were concentrated on this service.

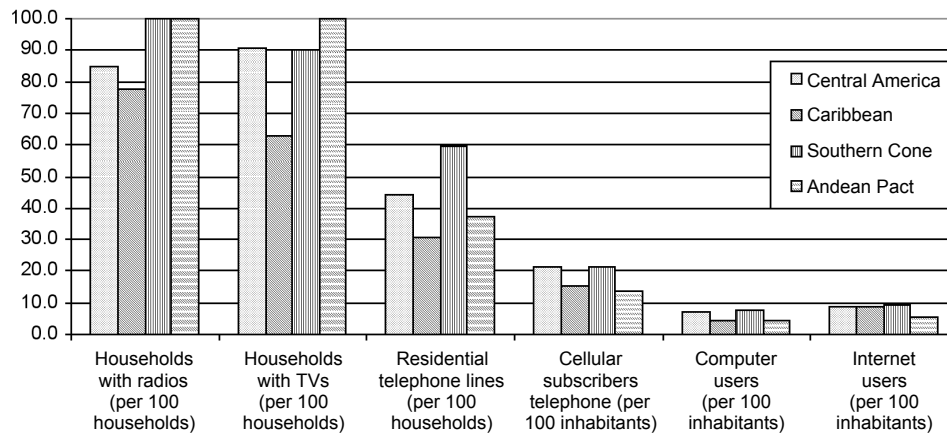
Source: Author's calculations based on data from the Private Investment Supervisor Organization for Telecommunications (OSIPTEL), www.osiptel.gov.pe and International Telecommunication Union (ITU), *World Telecommunications Indicators Database, 2004*.
N.B.: The potential monthly ICT budget is calculated on the basis of 3.6% of monthly income.

2.8 Ghz, and 512 RAM, a 60 Giga hard drive, CDRW and DVD and a 15" monitor, purchased over the Internet in April 2005 was US$ 1,499 in the United States; the same equipment cost US$ 1,560 in the European market, US$ 2,075 in Argentina; US$ 2,075 in Australia; US$ 2,145 in Costa Rica, US$ 2,189 in Chile and US$ 2,426 in Mexico (ITU, 2004).

[15] This pattern is based on broadband development through asymmetric digital subscriber line (ADSL), cellular 2G or 3G, cable or satellite.

Connection costs are excessively high for middle- and low-income consumers and only a very limited group (the highest decile of households by order of income distribution) can have access to the *full basket* of ICT goods and services, that is the tools that are available for increasing their knowledge base, processing information and communicating. At the other extreme, almost one fifth of households in Central America do not even have a radio set (see figure 2). Between these two extremes, there are several categories of access. Another population group (between 20% and 40%, depending on the country) has access to a *partial basket* consisting mainly of television and cellular telephones and, to a lesser extent, computers and cable television but without the means to pay for fixed-line telephones or Internet. Lastly, at least half of the population (the percentage is over 70% in some countries) has access to television but does not have individual access to cellular telephones or computers, much less Internet access.

FIGURE 2
ICT INFRASTRUCTURE IN LATIN AMERICA AND THE CARIBBEAN, *2002*



Source: International Telecommunications Union (ITU), *World Telecommunications Indicators Database, 2004*.

The characteristics of the digital divide, the current levels of spending on ICT, access costs and per capita income all point to the difficulties facing the region in its effort to emulate the high-income countries. These and other indicators, such as the fact that the proportion of its urban population is lower that that of the OECD countries (68% compared with 78%) restrict individual use of ICTs and call for the development of an appropriate path for providing digital access to the inhabitants of the region.

Spread of mobile telephony

The experience of the cell telephone is the most important in terms of the successful and rapid introduction of a new technology. Between 1998 and 2003, the number of cell phones in Latin America and the Caribbean increased from 20.5 million to 123.7 million, and the region's share of the world total moved from 6.5% to 8.8%.[16] During the same period, fixed telephones increased from 58.3 million to 89.6 million, with the region's share of the world total moving from 6.9% to 7.8%. Thus mobile telephony has already surpassed fixed telephony in the region (see figure 3); if this trend continues, by the end of 2005, there will be two cell phones for every fixed telephone.[17]

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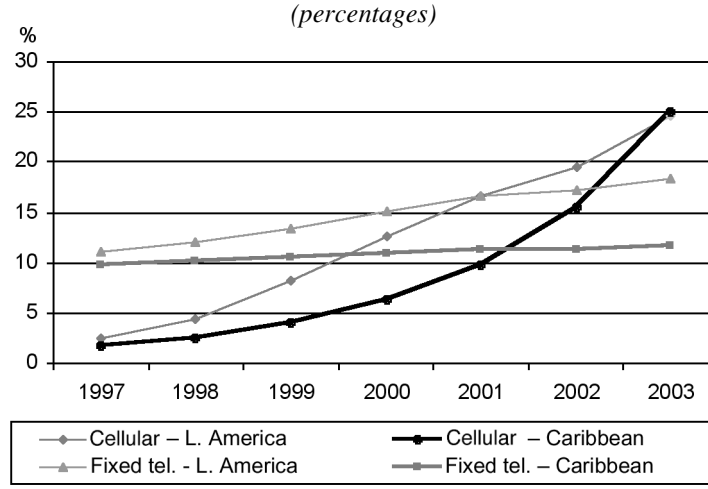
[16] In 2004, it is estimated that there were 14 Latin American countries with market penetration rates (number of mobile phones per 100 inhabitants) of more than 30%.

[17] The spread of mobile telephones followed the pattern of the S-shaped logistical function, typical of new technological products; this indicates that there are initial low-growth periods, with few users, which,

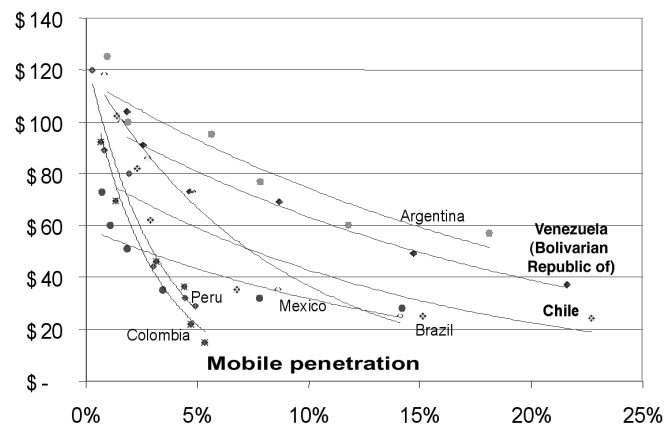
FIGURE 3
PENETRATION OF MOBILE AND FIXED-LINE TELEPHONES
(percentages)



Source: International Telecommunications Union (ITU), *World Telecommunications Indicators Database, 2004*.
N.B.: Penetration is calculated as a percentage of total population.

A key factor in the success of this technology was the reduction in costs. Mobile telephone networks cost 50% less to set up than equivalent fixed telephone networks; moreover, the former can be provided more rapidly, have greater modularity and require smaller scales. The cost of terminals diminished from US$ 1,500 in 1991 to US$ 150 in 2003, at the same time as the average revenue per unit (ARPU) declined from US$ 100 in 1991 to less than US$ 25 in 2003 (see figure 4), which was to be expected given the intensive activity in economies of scales and networks. The spread of the cell phone was possible thanks to "the caller pays" and prepayment arrangements

FIGURE 4
TREND IN AVERAGE REVENUE PER UNIT (ARPU),
BY LEVEL OF PENETRATION OF MOBILE TELEPHONY
(US dollars)



Source: Yankee Group [online] www.yankeegroup.com.

after reaching a minimum critical mass –considering network externalities– are followed by periods of high growth acceleration (imitation or epidemic effect); this moderates over time until the market achieves its maximum penetration or level of saturation.

and also to the asymmetries between access charges (interconnection charges) between mobile telephony and fixed telephony, which became possible as a result of the implementation of new public regulations.[18]

The process described relates to a world trend; in developing countries, mobile telephony plays a similar role to that played by fixed telephony in the developed countries during the 1970s and 1980s (Roller and Waverman, 2001). The expansion of telephone networks is important economically because it reduces transaction costs, facilitates synchronization and promotes the increase in information and knowledge flows with positive externalities. Given the difference in income between rich and poor countries, prior to the advent of the cell telephone, the scope of the least developed countries for extending their fixed telephone networks was limited and they even faced a vicious circle between small scales and scant incentives for investment. Thus, the scarcity of networks in poor neighbourhoods and rural areas increased costs; the failure to take advantage of economies of scale and agglomerations together with low income levels restricted the capacity to ensure that the necessary investments for setting up networks in these areas were profitable. Thus it should come as no surprise that very few countries in the region achieved rapid growth in fixed telephony in the 1990s, and that even those that did could scarcely exceed 30 telephones per 100 inhabitants.[19]

Unlike fixed telephony, mobile telephony spread almost simultaneously in the OECD countries and in Latin America and the Caribbean, although its impact was different. In the case of the former, cell telephones were initially used to supplement fixed telephones, which by the mid-1990s had achieved a penetration rate of 55%; subsequently, some three or four years ago, there was a decline in fixed lines, so that cell telephones could be viewed as replacing fixed telephones. In developing countries, after covering rapidly the segments that had fixed telephones, cell phones are fulfilling the function that fixed telephones did not fulfil, by extending access to telecommunications to broad segments of the population.[20] By virtue of this performance, mobile telephony could have a more important economic impact in countries of Latin America and the Caribbean than in OECD countries.[21]

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[18] The fall in the cost of mobile telephones is due not only to technological development but also to an implicit subsidy from the fixed telephone to the mobile through the asymmetry of charges for access to interconnection.

[19] Only seven countries in the region have succeeded in surpassing the 30% mark of penetration in fixed telephony. All are in the Caribbean subregion: Antigua and Barbuda, Bahamas, Barbados, Dominica, Saint Kitts and Nevis, Saint Lucia and Trinidad and Tobago. (Grenada's penetration rate is 29%). The next group (20%-28% of penetration) is made up of five countries: Argentina, Brazil, Chile, Costa Rica and Uruguay.

[20] The analysis is expressed in general terms. The intensity in the complementarity and/or replacement varies according to groups of users, depending on their income, age, geographic area, and so forth.

[21] Waverman, Meschi and Fuss (2005) point out that the impact of mobile telephony on growth has been twice as important in poor countries as in rich countries. These results seem to be significant. All other things being equal, if Indonesia had had the mobile penetration rate of the Philippines (8.7% versus 26.1%), the authors argue that its long-term annual GDP growth rate would have been 1% higher. Thus, differences in the mobile telephone penetration rate could account in part for the differences in growth rates between developing countries. It should be recalled, however, that the model indicates that bridging the gap in education between the two countries in question would have had a greater impact on the growth rate than bridging the gap in mobile telephony.

Collective access

The region has used various types of collective access to ICT. Recognizing that shared access is key for reducing the digital divide and considering that the firms that provide Internet access services to the public may not provide their services to the poorest segments of the population, many Governments in the region have set up programmes to improve public access to Internet. To this end, they have used three formulas: direct supply by the State, minimum subsidy through universal access funds, and investment funds, whose resources are the the subject of competition among local companies.The result has been strong growth in these public access centres. Looking at eight countries for which data are available and without taking into account private supply, it is estimated that the number of public access centres sponsored by Governments increased from 50 in 1996 to 4,900 in 2001, 6,000 in 2002, and close to 10,000 according to the most recent data available.[22]

In Peru, one hour's use of a public Internet centre cost just under 50 US cents in 2004. Thus, 45% of the population would have the economic means to surf for one hour per day. In 2003, there were more than 10,800 public centres, most the result of investments by private companies and civil society initiatives (San Román, 2004). It is estimated that between 2001 and 2003, there was an accrued investment of more than 50 million dollars, with an estimated monthly income of over US$ 7.5 million, creating approximately 25,000 jobs (15,000 direct and 10,000 indirect).

However, the national network of public Internet access still has low national coverage and a highly uneven territorial distribution. This poses the problem of how to finance the expansion of public access centres, especially in remote and low-income areas. In Mexico, for example, only about 10% of the population who would require access (because they do not have the service in their home) were served by public access centres in 2003.[23]

Despite the low coverage, the supply of public access centres has been diversified; educational establishments are not the only ones to participate; so do municipalities, public libraries, public services, foundations, trade unions and companies, which carry out a social function that can be financed partially with public funds. In spite of this deployment, there are still major deficiencies in terms of access, although with significant differences between countries; the number of potential users per telecentre[24] varies between 7,500 and 83,000 in 2004/2005 (see figure 5).

The territorial distribution of public access centres is uneven; for example, Venezuela and Ecuador –which had an Internet penetration of less than 6% of the population in 2003– show a strong regional variance of potential users per telecentre, with an average of between 10,000 and 150,000 (see figure 6).

Although there is already a critical mass of public Internet access centres, there is consensus that the most acute problems stem from their management and maintenance. "The annual costs of a telecentre are similar to, or in some cases exceed, capital investment costs. Installing a telecentre is easy, the hard part is to maintain it" (IIRSA, 2003). This has meant high death and birth rates for such establishments. For example, the life span of a telekiosk in Peru is no more than 14.5 months. Of the 71 public telecentres that existed in Nicaragua in 2002, 43 were closed in 2003 (GTZ, 2003). Experience shows that public subsidies were geared to the installation of public access

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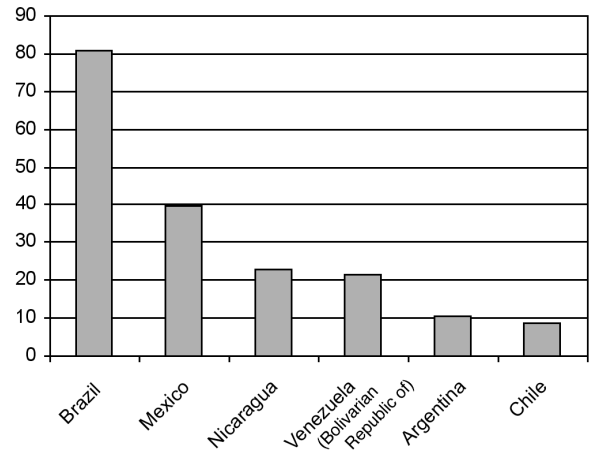
[22] Argentina (2002): 3,095 centres; Brazil (2005): 2,000 centres; Chile (2004): 1,259 centres; El Salvador (2004): 41 centres; Jamaica (2002): 26 centres outside of Kingston; Mexico (2004): 2,298 centres; Nicaragua (2003): 230 centres; Bolivarian Republic of Venezuela (2003): 1,123 centres.

[23] Figure based on data from the Federal Telecommunications Commission (COFITEL) of Mexico, http://www.itu.int/itu-d/ict/mexico03/doc/pdf/doc07_erev1.pdf.

[24] Rate of potential users per telecentre = (Total population – Population with home Internet access)/(Number of telecentres).

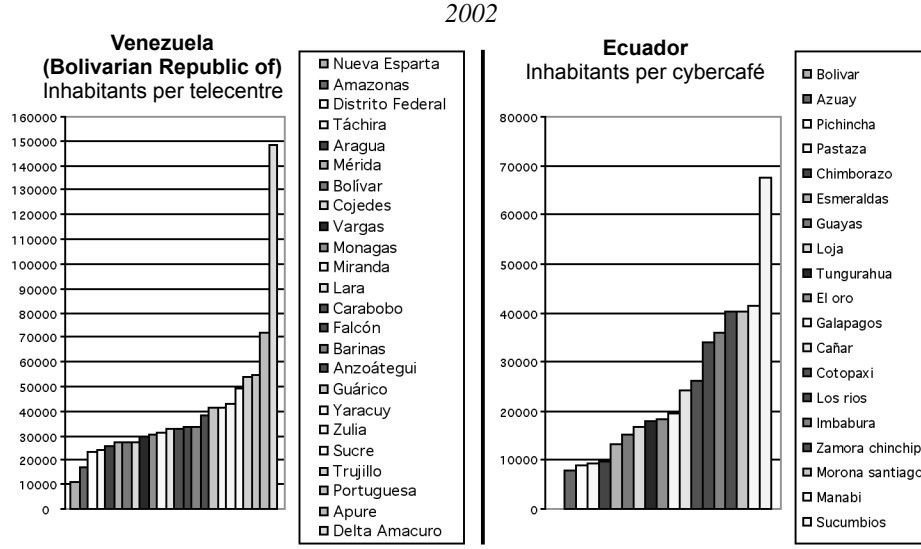
FIGURE 5
AVERAGE NUMBER OF PEOPLE REQUIRING ACCESS TO A TELECENTRE, SELECTED COUNTRIES
(thousands of persons)



Fuente: Observatory for the Information Society in Latin America and the Caribbean, (OSILAC) (2005), on the basis of Silvia F. Rabadan, and Roxana Bassi, *Centros Tecnológicos Comunitarios, La experiencia argentina*, 2002. Ministry of Communications. www.ctc.gov.a ; Federal Government of Brazil; Banco do Brasil; Government of Chile, Office of the Under-Secretary for Telecommunications: Evaluation of the status and characterization of the National Network of Telecentres, 2002; Informe Final de Año 2003; Informe de Monitoreo First half 2004, www.infocentros.gob.cl ; e-México National System, www.e-mexico.gob.mx ; GTZ: Study on the experiences of Internet centres in Nicaragua, 2003, www.developmentgateway.org/download/235768/Telecentros_en_Nicaragua_.pdf ; Statistical Observatory. Conatel, www.conatel.gov.ve.

N.B.: The number of persons who would need to use a telecentre is calculated by dividing the total population minus the number of Internet users, by the number of telecentres. Brazil: Telecentres provided for 2005 (project Casa Brasil + community Telecentres Banco Brasil), Internet users 2002; Mexico: Telecentres 2004, Internet users 2003; Nicaragua: Telecentres 2003, Internet users 2002; Venezuela: Telecentres 2003, Internet users 2002; Argentina: Telecentres and Internet users 2002; Chile: telecentres 2004, Internet users 2002.

FIGURE 6
VENEZUELA (BOLIVARIAN REPUBLIC OF) AND ECUADOR: COMMUNITY ACCESS CENTRES PER INHABITANT IN DIFFERENT GEOGRAPHIC REGIONS
2002



Source: Observatory for the Information Society in Latin America and the Caribbean (OSILAC), ECLAC, 2005, the basis of on the Statistical Observatory, Conatel and the National Statistical Institute (INE) of Venezuela (total of 796 telecentres in 2002). They include: Telecentres, Communications centres (CANTV) y Connection centres (Telcel). Office of the Superintendent of Telecommunications of Ecuador (total of 792 telecentres in 2004). They include: registered and authorized cybercafés belonging to the Internet for All plan.

centres, often based on private donations of equipment. However, in many cases, demand was overestimated and the requirements for sustainable management, underestimated, so that expectations that they would be self-financing were dashed.

The need to expand the networks of public access centres,[25] ensuring their sustainability over time, poses challenges for public policy-makers. The old model consisting in providing seed financing for ICT infrastructure, which would become self-sustaining over time works in few cases. Once installed, telecentres tend to press for public subsidies, especially to pay for broadband access. Thus, some countries have curbed the expansion of telecentres, focusing their efforts on consolidating their infrastructure, access and management networks, transforming them from access centres into service centres, thereby opening up the prospect of sustainability (Grupo Acción Digital, 2004).

Other important sites for accessing ICTs are schools and public high schools. Chile's experience shows the multiplier effect of connected schools: 37% of Internet users in 2003 said that the place where they most frequently used Internet was school, while home was cited in second place (35%). The countries in the region have striven to promote connectivity in public educational establishments, but the rate of penetration is still insufficient. Although Governments pledged that all students and teachers should have access to ICTs in their classrooms, schools, libraries and other teaching areas within a period of 10 years,[26] and despite their commitment in the Plan of Action of the World Summit on the Information Society to "connect universities, colleges, secondary schools and primary schools with ICTs" by 2015, access by schools and colleges remains very low and is growing slowly, albeit with some exceptions (see table 2). In 2001/2003, less than one quarter of primary and secondary schools in Colombia (2001) and Peru (2003) had computers. In Colombia in 2001, there were 36 students per computer in official educational establishments and

TABLE 2
ACCESS TO ICTS IN EDUCATIONAL ESTABLISHMENTS

Primary and secondary educational establishments (percentages)

Primary and secondary establishments	Colombia (2001)	Peru (2003)	Chile* (2005)
Number of establishments	59,119	44,878	9,500
With computers	24.1%	18.6%	n.d.
With Internet	6.3%	0.6%	75% (40% broadband)
Pupils per computer	36**	n.d.	30

Educational establishments in Colombia (percentages) (2001)

	Primary and secondary		Universities	
Educational establishments /access to ICTs	Private	Public	Private	Public
Access to computers	57	22	100	100
Access to Internet	21	4.5	96	95

Source: Peru: Ministry of Education. Educational Statistics Department, 2003; Colombia: National Department of Statistics (DANE), "Medición de las tecnologías de la información y las comunicaciones – TIC, 2001"; Chile: Enlaces programme.

Notes:
* The data for Chile include only government-subsidized establishments. The data for Peru and Colombia include public and private establishments.
** Includes pre-school educational establishments.

[25] For example, Brazil plans to create 6,000 telecentres by the year 2006 and to reduce the number of potential users per centre from 83,000 to 24,000 persons.

[26] Agenda for Connectivity in the Americas and Plan of Action of Quito, p. 30.

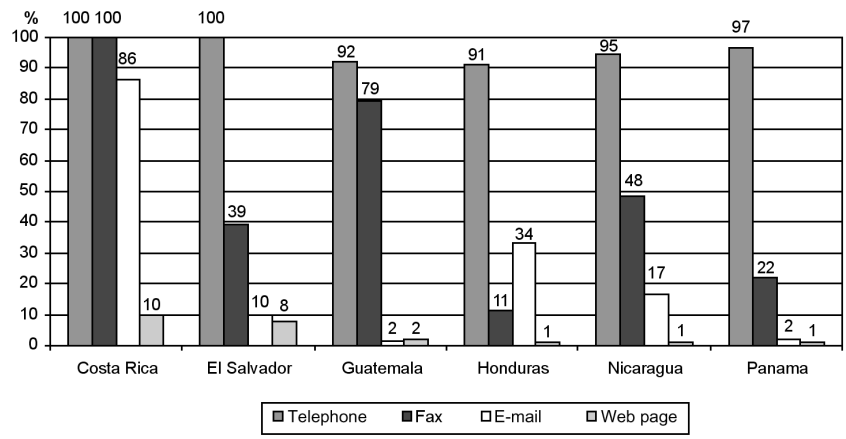
in Chile, there were 30 in 2005, while the figure for Europe in 2002 was 12[27] and that of the United States and Canada was 10 (Hepp and others, 2004).

Efforts in this area have been enhanced by cooperation between authorities in the educational sector, on the one hand, and the ICT sector, on the other. Inspired by initiatives such as "Computers for schools" in Canada,[28] which recycles computers for student use, some governments, including those of Argentina and Colombia, have instituted similar programmes. Ecuador and Jamaica, among others, are creating different kinds of schemes to provide ICT equipment to schools cheaply and efficiently.

The offices of local governments appear to be an obvious option to help with the supply of digital services, given their proximity to the citizenry and their influence in the community. But, although the high penetration rate of telephones in Central American municipalities shows that they have telecommunications networks (95% can be contacted via a telephone number) access to more sophisticated technologies is still incipient (see figure 7). The data for Chile show that ICT use (reflected in having a website) is highly concentrated in the 52 municipalities of the metropolitan region: 65% of metropolitan municipalities have a website, compared to 37% for the country overall.[29] Working methods and habits do not change automatically when a municipality gains access to the Internet, however. As figure 8 shows, in Chile and Peru, even in municipalities that have digital equipment, less than a third of the staff habitually use electronic mail or Internet.

New access technologies

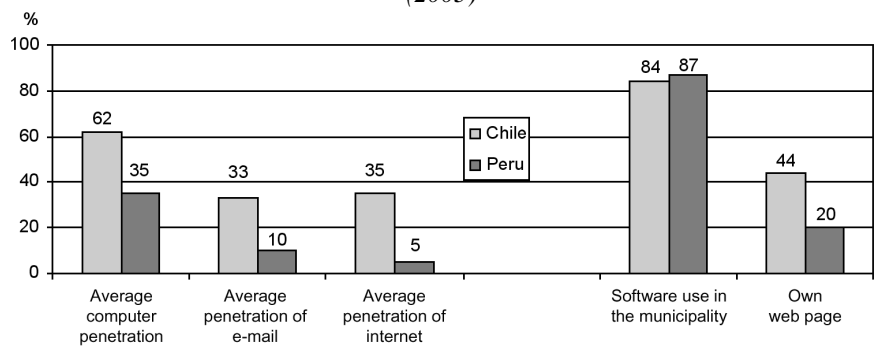
FIGURE 7
PENETRATION OF ICT INFRASTRUCTURE IN MAYORS' OFFICES IN CENTRAL AMERICA
2004



Source: Observatory for the Information Society in Latin America and the Caribbean (OSILAC), Calculations based on the Federation of Municipalities of the Central American Isthmus(www.femica.org), Corporation of Municipalities of the Republic of El Salvador (www.comures.org.sv) and Association of Municipalities of Nicaragua (www.amunic.org), 2005.

27 http://europa.eu.int/information_society/eeurope/2002/benchmarking/index_en.htm.
28 http://cfs-ope.ic.gc.ca.
29 Data from *Informe económico semanal*, Santiago Chamber of Commerce, 27 September 2004.

FIGURE 8
ACCESS TO AND USE OF ICTS IN MUNICIPALITIES THAT HAVE COMPUTERS (106 MUNICIPALITIES CHILE, 77 IN PERU)
(2003)



Source: Martin Hilbert, *Local e-government: Digital municipalities in Latin America, with empirical evidence from Chile and Peru, 2003*.

Note: Penetration is calculated by dividing by the total number of staff in the respective municipality and multiplying by 100.

Like cellular telephony, wireless technologies have become much more widespread. Many have argued that, unlike access to mobile telephony, which does not require the user to be literate, Internet access is of little benefit to the poorest sectors of the population if they do not have the education necessary to use electronic mail and other services.[30] Following this argument, Internet access need not necessarily be via computer. Other accessories, such as mobile telephones (which are much cheaper) can also be used. The first option proposed in this regard was Wireless Application Protocol 1.0 (WAP), which raised great expectations. But the early applications did not achieve the hoped-for commercial success and initial enthusiasm cooled, which has meant that WAP telephony has progressed more slowly than the optimistic projections of early 2000 suggested they might. In fact, by late 2004, of the almost 10 million mobile telephone users signed up for WAP services (representing a tiny fraction of the world's 1.4 billion mobile telephone users), 70% were in Japan or the Republic of Korea. Nevertheless, the Open Mobile Alliance (OMA) continues to work on this technology[31] to develop hybrid mobile/fixed wireless solutions, with a view to future applications in e-commerce, bank transactions and public procedures. However, the dominant trends at the moment are Short Message Service (SMS), at the lower end of the cost scale, and 2.5G and 3G (third generation mobile telephony)[32] in the middle to high cost range.

New wireless technologies, such as Wireless Fidelity (Wi-Fi),[33] which substitute traditional physical media, are now spreading rapidly. The region has witnessed the establishment of thousands of what are known as wi-fi "hot-spots", geographical areas with a radius of between 50 and 500

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30 Dasgupta, Lall and Wheeler (2001), qualify this point of view, arguing that pilot experiences show that poor households can use Internet, obtain benefits from it and even provide cases of learning by doing inasmuch as users, especially young people, do not require formal training. See also Duncombe (2000).

31 WAP 2.0 is superior to previous versions, because it delivers better graphic content and control of contents, faster transmission and higher security.

32 See, for example, Petrazzini and Hilbert (2001) and International Telecommunication Union (ITU), http://www.itu.int/osg/spu/ni/3G/casestudies/chile-venezuela/Chile-Venezuela.pdf.

33 Wi-Fi is a set of network technologies based on IEEE radio standards 802.11b, 802.11a and 802.11g, which enable high-speed wireless connectivity. Wi-Fi operates on radio wave lengths of 2.4 GHz to 5 GHz. It delivers wireless connectivity at data transmission speeds from 1 Mbps to over 50 Mbps, reaching distances of between 50 and 500 metres.

metres which are "lit" by wireless Internet access at data transmission speeds of anywhere from 1 Mbps to over 50 Mbps.[34]

Wi-Fi is only the first of a new wave of wireless technologies that are in full development.[35] In fact, the standard and applications for WiMAX technologies, which have a broader range, are now available.[36] Some of the region's countries are rolling out pilot projects for mining and agribusiness, for example. Standards have also emerged for Mobile-Fi[37] which enables communications between 3G cellular telephones and antenna connected to the Internet. There is also the ZigBee standard for developing technologies which coordinate the communications of many small censors (programmable logic controllers). These can be deployed in offices, agricultural and industrial sites to collect data on temperature, chemical elements, humidity and even movements, which they transmit to processing centres. Censors like these are designed for minimum energy consumption, low data transmission and a life span of up to 10 years, so they require long duration batteries.[38] Ultra wideband (UWD) technologies are also available for large-scale transmission of data over short distances; this standard and its products are being developed by WiMedia Alliance.[39]

Wi-Max, Mobile-Fi, ZigBee and UWB hold out promising perspectives. Pilot projects underway have shown that firms are interested in these technologies, as is public policy. The aim of such projects is to expedite learning by users, telecoms firms, equipment manufacturers and public institutions (ICA, 2005).[40] There are regulatory obstacles, however, and these technologies also have to prove their efficiency in the market.

Interactive digital television is another promising alternative technology for access to interactive communications networks. Unlike PCs, which have a low and selective penetration in the region, television is accepted and used by people of different social classes, ages and levels of education, and more than 90% of households have access to it. Digital television is still being introduced to the markets, and there is a regulatory debate that will grow in the next few years. One of the issues in this debate is the choice of technological standard, which has taken on particular importance in Brazil, where it has gone beyond a mere technological discussion (see box 2).[41] Another issue is the future organization of the television and radio industries, which is closely

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[34] The speed and real distance of a particular installation depend on the number and type of barriers in the path of the radio waves in the area covered, as well as interference in that frequency.

[35] Other options are emerging in the form of Unlicensed Mobile Access technology (UMA), which provides access to unlicensed cellular and private networks in the United Statnesm such as Bluetooth and 802.11, giving access to the full range of services through these networks. See http://www.umatechnology.org.

[36] WiMAX (standard known as 802.16e) provides broadband connection (75 Mbps) over distances of 10-50 kms.

[37] Mobile-Fi standard 802.20 competes with WiMAX, because although it lacks the geographical range of the latter system, it enables communication between 3G mobile telephones and Internet, even when the user is travelling at up to 250 kilometres per hour.

[38] The project is being developed by ZigBee Alliance, which includes Philips, Motorola and Mitsubishi, and targets industry, construction and the high-consumption segment of the housing industry. See http://www.zigbee.org.

[39] This group was created in March 2005, the result of the merger of WiMedia and Multiband OFDM Alliance SIG (MBOA-SIG). The United States Federal Communications Commission (FCC) approved the sale of UWB products and networks for indoor or handheld UWB devices. See http://www.wimedia.org.

[40] Chile's Technology Fund (FONTEC) has also launched a competition for pilot projects on experimental development of wireless technolgies in firms.

[41] There are three technical standards for digital television: the digital video broadcasting (DVB) standard developed in the European Union, which has already been adopted in many Asian countries; the Advanced

associated with the question of technological convergence. Supposing that television infrastructure can be used to provide interactive services, by using set-up boxes linked to analogue television sets, for example, digital television could become an important means of narrowing the digital divide.

BOX 2
THE DEBATE ON DIGITAL TELEVISION IN BRAZIL

Most of the Latin American and Caribbean countries are "takers" of standards and protocols developed in industrialized countries. This may be an efficient option, but Brazil's establishment of the Brazilian Digital Television System (SBTVD) in 2003 shows the importance of exploring public policy options and warrants consideration by other countries in the region. Brazil is exploring a pattern of digital television that focuses not on image quality but on information and service options. Television reaches 95% of households in Brazil, so the possibility under review is to install digital set-up boxes linked to existing analogue television sets. Where interactivity is not available, digital TV would disseminate important public service information, including health and education. Where the media for interactivity are available (through fixed or mobile telephony), however, services could be offered too. This might mean that the pattern ultimately chosen would have limited interactivity and would lack the image and sound quality available in North America, Europe or Japan. Those in favour of this option argue, however, that if research, development and innovation pay off and the technical and financial assessments are consolidated; this option could become a cheap and efficient means of providing massive access to large swathes of the population.

From this point of view, the digital television project aims not only to expedite digital inclusion, but also to propel research and development efforts and boost the hardware, software and contents industries. But the final model must stand the test of the markets. The guidelines for SBTVD efforts are interactivity, low cost, robust reception, flexibility to adapt to a variety of business models and ability to evolve in response to market demand. SBTVD will also have to seek out technological alternatives to adapt existing television sets to the possibilities of digital receptivity, bearing in mind the implications of using the electrical radio spectrum and other regulatory consequences that arise from a digital television standard.[42] In particular, measures are needed to heighten competition in the equipment supply market.

Setting up SBTVD is an example of research for the development of alternative technologies with strong support from the public sector.

Efforts are being made to speed convergence among alternative access technologies. Based on the success of mobile telephony and Internet, especially in the framework of the Japanese standard for digital television, some of the technological alternatives being implemented enable mobility through digital television or, the other way around, the transmission of videos and so on through mobile telephony. Both these directions of research and current development efforts are speeding convergence among digital access networks, gradually building up the "network of networks". Any assessment of alternative access technologies should consider the range of solutions available, taking into account the dynamics of technological convergence.

Television Systems Committee (ATSC) standard developed in the United States; and the Integrated Services Digital Broadcasting (ISDB) standard developed in Japan.

42 The Ministry of Telecommunications also proposes to provide existing television and radio concession holders with a 6 MHz channel in addition to each analogue channel, to be used during the transition from the analogue to the digital system.

Capacities and knowledge

ICT use in small and medium-sized businesses

Small and medium-sized businesses (SMBs) form part of a complex social and economic fabric that encompasses their own workers and owners, their goods and services suppliers and their clients (other firms who need their products or services, or final consumers). Bearing in mind that microenterprises and SMBs generate around 40% of GDP in the Latin American and Caribbean countries and over 50% of their employment, the objective of increasing productivity and lowering unemployment in the region depends to a large extent on these firms' ability to keep their foothold in the market and grow.

ICTs have become a determining factor in the operation and productivity of large firms in the banking, industrial and commercial sector. The digital network for credit card payments all over the world has become a crucial factor in financial and commercial operations, for example. In this regard, SMBs can be expected to grow and increase their profits to the extent that they adopt ICTs massively in administration, production and marketing of their products.

If digital networks are to become widely used, overlapping and reinforcing the fabric of SMBs, business owners need to understand the rationale of investing in ICTs and why it produces benefits. Regardless of the size of the business, businesspeople will invest in capital goods or in reorganizing production only when convinced that the effort will translate into increased productivity and profits. On this basis, the extent of ICT use in SMBs is classified below according to the type of digital network infrastructure they employ (without a network, with an intranet, with an extranet). Each of these categories implies a different level of knowledge. The level of knowledge in the firm will determine how easy it is to determine the benefits of technological change, the costs involved and the organizational changes necessary.

The first level (no network, mono-user information systems) requires a relatively small investment in computers and software for office work (word processing, correspondence), administrative control (accounting and wage payments) and either training employees to use the new tools or hiring new employees who already have these skills.

The second level (intranet, internal multi-user information systems), requires the use of more sophisticated applications that link production and sales to administrative control programs, such as production or sales results that feed directly into staff wage systems, or production systems

that monitor the use of raw materials and the inventory of finished goods with strict product cost statistics. Such systems require information to be shared and generated in different parts of the firm (production, sales, and administration), for which an intranet is required.

The third level implies an extranet and corporate information systems whose intranet is integrated with the networks of suppliers or clients. This network infrastructure is used to effect on-time orders or dispatches, administer the firm's supply chain and match production and sales to client needs. This will probably require devices to capture data in real time as it is produced (sensors, barcode readers, sales points).

This classification does not consider access to Internet, e-mail, online financial transactions or e-commerce, since these services are supplied by independent external organizations in the market and their use does not imply a technological change for SMBs, which can accede to those services regardless of the organization and technical level of their own business.

These levels of ICT use in SMBs serve as a reference to establish a plan of capacity development, since each level corresponds to a different type of knowledge. The State can either offer businesses and technical staff training on organizational or technological matters through public training institutes or let the market build these capacities.

In order to reach the first level, from the ICT demand side, business owners and employees need to become literate in computers, Internet and management techniques that use software (accounting, budgets, payment of staff). This is usually undertaken by the firms that sell computers and software, and governments have also assumed part of the task through public education systems and telecentres. On the ICT supply side, as well as firms that sell computers and basic software, SMBs need to be able to source in the market firms that develop and maintain applications for their size of venture. The second level needs computers and basic software, an internal digital network infrastructure (cabled or wireless), multi-user programs for production control or administration, and intranet administration (security, levels of access). It makes sense to use these systems only if production and administration are properly organized (division of labour, production and use of information, and so on). The third level requires, in addition to the needs of the second level, an organization that reflects the firm's operation as a large chain or cluster encompassing every step from raw material suppliers through to distributors and final consumers.

The sector that offers computer and software (and even hardware) services also needs to be developed in order to modernize SMBs. Such services firms have become consolidated in Latin America and the Caribbean, offering products suitable for all three levels that complement and compete with the supply from countries that are traditional producers of digital technologies.

A telephone survey of 454 urban SMBs in Bolivarian Republic of Venezuela, Chile, Colombia, Costa Rica and Mexico in February and March 2004 found that 97% were using computers, 94% the Internet and 92% e-mail (UNCTAD, 2004, p. 38-58).[43] The percentage of firms using computers and Internet was more or less the same in all five countries, and varied little from medium-sized firms (51 to 200 employees) to small firms (11 to 50 employees). E-mail was used slightly more in the medium firms. This means that almost all the firms surveyed had reached the first level of the classification of ICT use proposed above.

A corporate intranet, which is a feature of the second level of ICT adoption, was found to exist in 59% of the firms surveyed in Bolivarian Republic of Venezuela, 56% in Chile, 40% in Colombia and 27% in Mexico. Across the five countries, 52% of medium-sized enterprises –but only 35% of the small ones– used intranet. In other words, many more medium-sized than small

[43] Some 90 firms were surveyed in each country; caution is required, therefore, in extracting conclusions based on an expansion of this sample.

firms are reaching the second level (sophisticated applications that require information sharing in an intranet).

Of the SMBs surveyed, those that corresponded to the third level of ICT adoption (i.e. those with an extranet), represented 25% in Bolivarian Republic of Venezuela, 23% in Chile, 11% in Costa Rica, 8% in Colombia and 2% in Mexico. All the firms that had an extranet also had an intranet.

The findings of this survey offer a first approach to the distribution of the SMBs that use ICTs at the proposed levels. The huge effort would be needed to bring all SMBs to the third level, considering that in Latin America and the Caribbean there are less than eight computers per 100 inhabitants and less than 10% of the population uses Internet.

Knowledge needed to accede to ICTs

(i) Levels of digital literacy

Three levels of digital literacy may be defined: basic, intermediate and advanced.[44] Unlike in formal education, no institutional instruments, curricula or certifications exist to establish clear boundaries between the levels of this type of knowledge and skills.[45] Each level is reached by different modalities of training, as shown in table 3.

TABLE 3
LEVELS OF DIGITAL TRAINING

Level of literacy	Infrastructure	Type of educators
Basic	Computer	*On-the-job training*, environment. Education system.
Intermediate	*Software*	Tutors, disseminators.
Advanced	Sophisticated *software*	Specialist tutors. Software suppliers.

Source: Economic Commission for Latin America and the Caribbean (ECLAC).

The basic level requires access to a computer, and the respective training processes usually occur through contact with people who are familiar with computers. In this school teachers and other social agents play an important role. The programmes used are increasingly intuitive and now facilitate direct access such that the manufacturers of programmes for this level have found it unnecessary to continue supplying manuals. This is an eminently empirical learning process which requires constant practice with a computer. Just as functional literacy can be achieved only when

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[44] In using terms such as basic, intermediate or advanced training, or others taken from formal education, it is necessary to avoid confusing digital training and literacy with school education. These terms have a meaning of their own in the context of digital training and the training institutions and resources they require are not necessarily the same as those of school education. However, this does not mean that digital training cannot use educational institutions, school or otherwise, to achieve its purposes.

[45] The basic level is defined as the set of skills needed to handle general use programmes in their most simple form, such as word processing, games, chats and access to websites with a known address. The intermediate level is the set of skills and knowledge needed to handle general use programmes at a more complex level and more sophisticated programmes, such as spreadsheets and image processing (Dream Weaver, Photoshop, etc.) at an elementary level, and conduct searches on the Internet. The third level is defined as the set of skills and knowledge needed to use sophisticated programmes at an advanced level, as well as software for management and use in production activities.

there is access to reading material and incentives to read, digital literacy is possible only when there is access to computers. Inasmuch as contemporary culture places a positive value on computer use, young people and most adults do not need any other incentives to take an interest.

Attaining the intermediate level is more complex. First, it takes more complex learning resources both in terms of teachers and in terms of the time and characteristics of the learners. With regard to learning resources, although some people do reach this level in a self-taught manner or learn from their environment, in most cases well-trained tutors who can deliver systematized knowledge are needed. Time is another resource that needs to be administered: systematic learning requires constancy and regularity and, above all, motivation on the part of the learner. The learner usually contributes most learning time, because of the general nature of these skills and knowledge.

Lastly, advanced literacy means multiplying the conditions and difficulties of the previous level. The learning resources are more complex and the processes longer and more demanding. It is a specialized type of training with specific applications. In addition, since this level implies specialization, it is necessary to define learning areas, matching training strategies to learner's needs. The investment in this training, which is more expensive than the infrastructure, must be factored into all policy considerations. For workers who have a contract arises the question inherent in all training strategies: whether the time and operational resources will be contributed by the firm or the worker.[46] The greatest incentive for this level of training is the potential increase in wages when it responds to real demand for human resources.

(ii) Target groups of digital training policies

In planning digital training policies, policymakers have to address such questions as whether to simply respond to the demand for human resources, whether to aim to generate a supply regardless of demand, or whether to attempt to train the whole population, irrespective of what market conditions indicate. There is no one-fits-all answer to this, but it is useful to draw a comparison with formal education. Education systems have been developed with a view to gradually increasing coverage, and digital literacy should be managed in a similar fashion. The difference, however, is that the education system associates levels of schooling with age, while digital training should be construed, at the basic level, in a way that encompasses all individuals within society. The concept of "basic level" should evolve over time to become more inclusive. These changes will depend on the development of software, which has become increasingly intuitive, as well as the extent of digital literacy of the population at a given point in time and the demands of individuals and of economic and social activity. The objectives of intermediate and advanced digital training and literacy are defined by the explicit and –especially– implicit demands of economic and social activity.

Although universal coverage should be the aim for the basic level, at the intermediate and advanced levels it is necessary to define priorities on a sectoral basis and depending on the level of development of the target groups: adult workers¸ young people of school age, social agents (teachers, social municipal employees, nurses, etc.), young people engaged in a learning process, managers of microenterprises and SMBs, and the public sector.

Based on needs for digital training, policies should initially aim to provide computers and access to them in strategic centres to ensure maximum impact, and to train social agents who can act as technology disseminators. The second phase is to develop the intermediate level. At this point it is necessary to distinguish between two types of skills: general skills such as the ability to conduct advanced operations in Internet and use spreadsheets and databases; and more specific skills such as the use of production or management programmes.

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[46] Some specialized software manufacturers include training with the sale of the program.

It is important to distinguish between general and specific skills at the intermediate level, because these affect the policies pursued, the institutions that conduct training, the length of training and the usefulness of the skills learned. In the area of professional training, a wealth of experiences and literature speak of this distinction; it has formed one of the core themes of analysis and policy in the last two decades and is now being examined afresh in relation to digital literacy. The heart of the debate has been whether to afford emphasis to more general basic skills or to the formation of expert skills, and this clearly applies also to the digital environment. Whatever the option chosen, it must be on a massive scale – it must cover a large proportion of the population if it is to have any appreciable effect on production and life in society and serve as a catch-up strategy. Quantity is crucial in these strategies, which means having adequate financial, institutional and pedagogical resources and using them to reach a large proportion of the target population.

(iii) Digital training institutions

Digital literacy in the region, at least at the basic level, has been achieved mainly by means of specific initiatives outside the school system, although there are efforts to incorporate them into schools too. The institutional fabric of digital training is far from being consolidated. With the exception of Mexico, which has schemes for government employees, there are no systems of national certification of capacities or skills in the region, which means that there are no mechanisms to coordinate the supply of training in this area. This lack of coordination is also reflected in the nature of digital capacities, skills and knowledge, which are not organized according to any kind of pattern of preparatory instruction. This makes structured action more difficult but also represents one of the strengths of digital training, since it permits more rapid, large-scale processes with less procedural obstacles and more flexible use of resources. Systems to certify digital capacities are therefore necessary and should be set up and operated independently of training institutions.

Three types of activities or instruction have a key role in this development: (i) self-teaching, with or without the aid of manuals or non-professional tutors; (ii) government institutions that have begun digital literacy processes in the form of campaigns, installation of computers, dissemination, etc., and (iii) public or private training institutions that have structured courses in response to real or supposed demands. This is in addition to the school system, especially for basic digital literacy. The school system has been both a complement to and a facilitator of self-teaching and of broad digital literacy campaigns, the most successful of which have targeted not only students, but also parents.

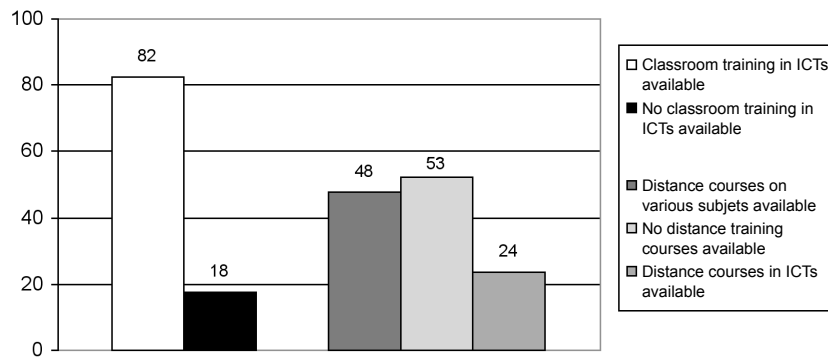
There are differences between literacy gains made through this type of campaign and those achieved by training institutes. Large-scale campaigns target basic levels and skills and are inclusive in nature. The training provided in institutes is specialized and tends to be exclusive, insofar as students have to pay a matriculation fee. Public training institutes at the national or subnational level offer specialized digital training programmes in almost all the Latin American and Caribbean countries. These target the intermediate or advanced level and admittance to them is limited. Their programmes cater to a demand that begins with training in word processing and spreadsheets and ends with specialized general use programmes. Firms sometimes use tutors or training institutes to train their staff in digital skills, especially in the use of software that is specific to the production process or management which, by definition, is even more exclusive.

It is difficult to estimate the proportion of the population to have received this type of training, given that every city has a large number of institutes, academies, schools, associations and so forth that teach some sort of digital technology, software or use of Internet. These have sprung up, at least at the intermediate and advanced levels, in response to demand, and their share in the total supply of trained individuals is beyond the scope of the statistics available. They can reasonably be assumed to account for a large share, however. Information on their quality is also lacking, since there are no mechanisms to accredit or certify the skills that they supposedly impart. The information available gives an indication only with regard to the larger institutions, such as

national training institutes, and those pertaining to business associations. This collection of digital training modalities and institutions is not coordinated in any way, and cooperation links are rare.

Use of ICTs in the labour market is largely a function of the digital literacy of the working-age population. Learning by doing is most common at the level of the average user, but much more advanced uses of digital technologies and networks require systematic training. In many of the countries national training and learning centres have operated for decades. Figure 9 shows that most of these have adapted to the new challenges of ICT training: 82% offer some type of course on the use of Office applications, Internet navigation, use of e-mail and training on databases or similar. What is more, 48% of national training and learning centres use ICTs to train through electronic learning applications, and 24% offer virtual courses on the use of these.

FIGURE 9
PERCENTAGE OF COUNTRIES OFFERING TRAINING IN ICTS IN NATIONAL APPRENTICESHIP, INSTRUCTION AND TRAINING CENTRES, 2004
(17 countries)



Source: OSILAC, 2005, on the basis of National Institute for Technical Education (Argentina), TVE Council (Barbados), National Institute for Labour Training (Bolivia), National Commercial Training Service (Brazil), National Service for Training and Employment (Chile), National Service of Apprenticeship (Colombia), National Apprenticeship Institute (Costa Rica), Ecuadorian Professional Training Service (Ecuador), Salvadorian Vocational Training Institute (El Salvador), National Professional Training Institute (Honduras), HEART NTA (Jamaica), National Institute of Technology (Nicaragua), National Service for Professional Advancement (Paraguay), National Service for Industrial Work Training (Peru), National Technical and Professional Training Institute (Dominican Republic), National Employment Bureau (Uruguay), National Institute of Educational Cooperation (Bolivarian Republic of Venezuela).

In addition to these centres, efforts are being made in various countries to face up to the challenge of creating human capital for the information society. In Colombia, for example, the project "PRYMEROS" has informed and trained over 2,500 small and medium-sized enterprises in organizing and adapting the use of ICTs taking into account the production chain and the cluster to which they belong. In Mexico, the programme @Campus, which trains and certifies the capacities of public officials, has the target of reaching 49,000 government employees over a five-year period.

The Ministry of Education and the Ministry of Labour of Chile initiated a national digital literacy campaign with the target of providing basic training for 500,000 adults (8.5% of the work force) in computer use and Internet access, using the national network of public access centres and the numerous digital government services available on the Internet. At the end of 2004, training had been provided for 400,000 persons, so that it is expected to more than comply with the target for the end of 2005.[47]

[47] Data from the Ministry of Education of Chile, *Agenda Digital te acerca el futuro*, 2004.

Research and development in scientific and technological networks

The potential for learning, adaptation and innovation in the use and creation of new digital technologies and networks require systematic efforts of research and development R&D and technology transfer. In some cases this takes place in the development of access technologies and networks, as in the pilot projects for digital television and wireless technologies that are underway in some countries. In others, it may be focused basically on software development, mainly applications incorporated into the firmware, which requires an intense R&D effort.

This requires careful consideration of the specific nature of R&D for ICTs. In fact, only a few countries of the region can make significant progress in R&D in hardware, as such progress is closely associated with foreign investment or the presence of large and capital-intensive microelectronics enterprises. The investments, both foreign and domestic, in the hardware industry have been concentrated in Mexico, Brazil and Costa Rica. At the same time, government and university programmes which promote R&D in hardware, middleware and the associated software only exist in the largest economies in the region.

This does not mean that the other countries of the region have no opportunities for innovation. On the contrary, even if they do not produce chips or motherboards, many countries are going through a process of apprenticeship in ICT innovation which is concentrated in public-sector institutions, enterprises and entities, which frequently use digital networks. This process has been concentrated in efforts to adapt networks and access technologies, create software and Internet-based applications, as well as adaptations of computer systems for production process management. This occurs in many sectors of the economy, mainly in technology-intensive sectors, export industries and services associated with applications for the public sector.

In the scientific field, ICTs have been used to support the creation of knowledge and there has been significant development of high-velocity networks between universities and research centres. The interconnection of research networks includes not only hard science and engineering centres, but also social disciplines. In some countries, the national research networks are interconnected with networks in other regions, such as the European DANTE network or Internet 2. Since 2004, Latin American Cooperation for Advanced Networks (CLARA) has been connecting networks in 18 countries of the region. In some, this initiative has been the driving force for making progress in the establishment and maturation of national networks (see table 4).

Standards

ICT standards are specifications which determine the compatibility of communication products and networks and may give rise to environments with multiple providers, facilitating competitive prices, a variety of supply channels, innovation and differentiation of products. At the same time, they ensure interoperability in a multiequipment environment of providers, market integration and the formation of efficient productive systems (Rosenbrock, 2004). Given that, in some cases, the markets may not be efficient in setting standards, institutions are needed to implement initiatives to reach agreements on standards which are generalized in the markets or public policies which set obligatory standards for the State (for example XML), which, because of network externalities, will have a significant impact on those that the market adopts.

The standards are economically necessary and socially desirable because they generate direct or indirect network externalities which increase the benefits of ICTs. The rapid rate of technological change in recent decades has shown the importance of the link that exists between

TABLE 4
LATIN AMERICAN RESEARCH NETWORKS
(2005)

Country	Name of the network	Year of creation	Number of associated organizations	Types of associated organizations
Argentina	RETINA	1990	52	37 higher education 8 research 4 ministries 3 NGOs
Bolivia	BOLNET	1990	20	7 higher education 8 research 3 ministries 2 NGOs
Brazil	RNP	1989	369	242 higher education 53 secondary education 68 research 6 ministries
Chile	REUNA	1986	19	18 higher education CONICYT
Colombia	Advanced Academic Network (Connectivity Agenda)	2005	75	higher education research public and private entities
Cuba	REDUNIV	Not specified	21	16 higher education 4 research 1 ministry
Ecuador	FUNDACYT (REYCYT)	1994	38	32 higher education 2 research 1 technology transfer centre
El Salvador	RAICES	2003	8	7 higher education 1 research
Panama	REDCYT	2002	10	7 higher education 1 research 2 government
Paraguay	ARANDU	Not specified	22	22 higher education
Uruguay	RAU	1990	47	2 higher education 2 secondary education 1 primary-secondary education 6 ministries, 4 NGOs 1 hospital, 1 industry
Venezuela (Bolivarian Republic of)	REACCIUN	1994	73	30 offices with WAN connections 33 higher education 30 ministries 9 NGOs 1 institution, not specified

Source: Red CLARA and Economic Commission for Latin America and the Caribbean (ECLAC), Benchmarking the Plan of Action of the World Summit on the Information Society in Latin America and the Caribbean (W.15), Santiago, Chile, 2005.

technology standards in ICTs, economic performance and social well-being.[48] ICTs can thus be disseminated more rapidly when the public domain of knowledge and information expands. The protection of intellectual property and commercial secrecy are incentives for innovation; but in the case of ICTs, common standards, open and freely accessible codes, and the availability to the public of the stock of knowledge of humanity are powerful incentives for the generation and dissemination of innovation.

[48] OECD indicates that 80% of international trade is affected by standards.

There are different types of standards; in particular, those that are generated by the so-called intermediate layers which facilitate development of services and value added applications, a crucial factor in countries where an emerging ICT industry cannot yet compete in international markets. The producing and marketing enterprises for ICT products have two types of incentive-related behaviour. On the one hand, they try to produce their own standards to generate technological dependence in the user –whether the technology provider or the final user– and place barriers to exit of the consumer and the entrance of competitors. On the other hand, convergence towards common standards facilitates the entry of new goods and services, expands their possibilities for competition and facilitates the development of technological innovations on the basis of a common platform.

In view of these incentives, ICT markets experience complex trends in relation to standardization, which may occur by consensus or through a war which finishes with the victory of one option (Hilbert and Katz, 2003). The prevailing market standards have two origins. Some are de jure, which means they are generated from a consensus in an institution. In this case, an open standard may be used by any entity in the framework of the terms established. Others may be classified as de facto standards, which means they were established not by any standardization organization such as ISO[49] or the Internet Engineering Task Force (IETF)[50] but through market mechanisms. In many cases this type of standard has the sponsorship of an enterprise that has achieved a dominant market position and has intellectual property rights, for example Microsoft in relation to Windows.

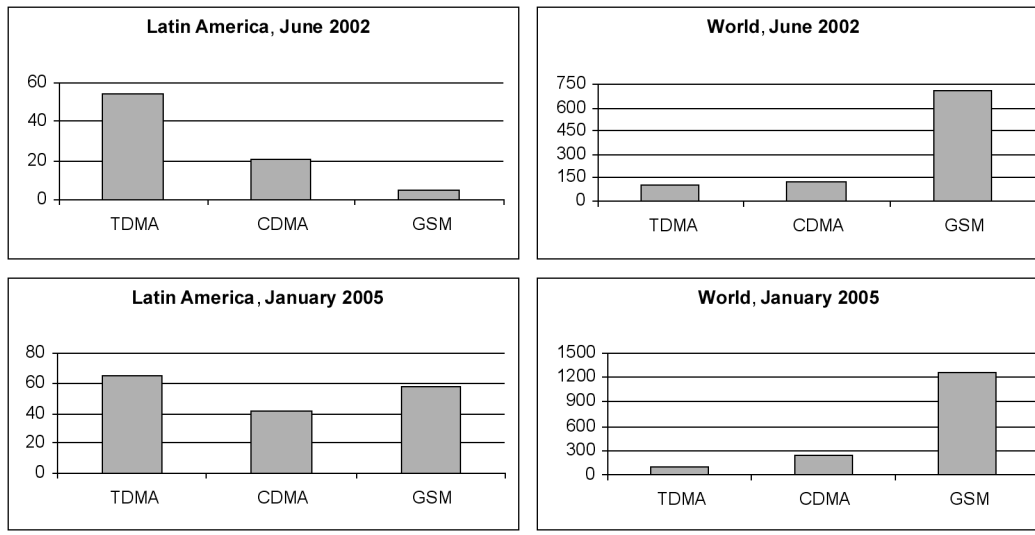
In the case of open standards, the determining factors for their predominance in the market are the demand of users and their ability to coordinate themselves. In the case of de facto standards sponsored by an enterprise, demand is not the only factor, and also important are the strategic decisions of the dominant enterprise. For the lock-in effects, a firm may act to increase the cost of change to the user, thereby increasing dependency and mitigation costs.

Most of the countries of Latin America and the Caribbean use the standards prevailing or emerging in the world markets. Nevertheless, this does not mean they are condemned to being passive. As indicated by ECLAC (2003a, p. 90), "the enormous significance and potential strategic power of technical standards are often underestimated in Latin American and Caribbean technological development strategies".

The neglect of this issue and the uncoordinated search for foreign investors have created a uniquely challenging standards scenario in the region. Before introducing a new technological system (such as digital television or the third generation of mobile telephones), an institutionalized testing process should be pursued in order to identify the best solution. It is apparent that this has not always been the case in the region, as shown by the experience with standards for the second generation of mobile telephony, in which investments in the TDMA standard had to reconsidered in view of the global advance of GSM (see figure 10). Market mechanisms result in an increasing variety of standards, while in other regions of the world there is a predominant standard. Although the trend in the region is to reduce variety, changing standards is costly and may result in investment losses for the operators, costs to users and a loss of economies of scale, which slows down the development of ICTs.

[49] http://www.iso.org.
[50] http://www.ietf.org.

FIGURE 10
USE OF 2G MOBILE TELEPHONY STANDARDS IN LATIN AMERICA AND THE WORLD
(Millions of telephones for each standard)



Source: 3G Americas, www.3gamericas.org.

TDMA (*Time Division Multiple Access*): multiple access technique in which the shared resource is time.

CDMA (*Code Division Multiple Access*): multiple access through code division.

GSM (*Global Systems for Mobile communications*).

Software models

The discussion of different models of software, especially for the use of open source code software has increased in visibility in the region over the past two years. A search for the term "free software" in Google produces 10 times more links in the countries of the region in 2004 than it did in 2002. With the progress in the debate, the number of myths and ways of interpreting the advantages and disadvantages of the different software models have also increased. This discussion can be organized in three components.

The first component covers the development of software and the granting of licenses for its use and does not imply an attitude to technological neutrality or the promotion of a specific technology. A second aspect includes topics such as quality, efficiency, interoperability, failure and security risks and development costs and maintenance. The third refers to the level of competition in the market and should take into account, in addition to market considerations, the technological characteristics of the software market, such as interoperability, lock-in costs and switching costs.

The discussion on development and the granting of licenses for software is influenced by the growing investment in this activity and the fact that, once it has been developed, the marginal cost of reproduction tends to zero. There are two universes to consider; the development of open source code software and its marketing or free distribution.

When the software is marketed with closed source code, it is proprietary software, has copyright registration and, increasingly, tends to be patented.[51] In the case of this type of software,

[51] Unlike countries such as the United States, all of the Latin American countries (including those who negotiated or are negotiating a free trade agreement with the United States) have only authorized copyright

income is generated by royalties for the granting of licenses.[52] When software is distributed freely, but with a closed source code, it is called freeware. Software with an open source code may also be marketed, and generate income through maintenance services and development. Lastly, there is non-commercial software with an open code source. In this case a general public license (GPL) may protect it from being converted into proprietary software and marketed. Any modified version of the software must be distributed under the terms that it may be used, modified and distributed freely (also referred to as copyleft). In this case it is open source code and free software.

The two types of open source code software (free or commercial), except in cases governed by a GPL licence, may serve as a basis for a closed and marketable software system, which gives rise to a mixture where different functions can coexist.

There are a number of arguments in this debate. By its nature, open source code and free software has externalities for the creation of new public knowledge. The supporters of this type of software indicate that, as production is largely based on programming of previous codes, there is the risk of depending on a single provider of different generations of software solutions. If the only enterprise that produces proprietary software has innovation difficulties, or in the worst case, goes bankrupt, the knowledge of its information solutions would be lost. The user would have to seek a new information solution, which would necessarily be better, and could mean a breakdown in the development of digital applications which would bring high switching costs.

If the code source is open, different programmers can use the knowledge publicly available, respecting the respective intellectual property rights (through GPL-type licenses). In this way, the probability that some programmer in the world finds new solutions to develop, complete and extend the software increase with the size of the existing network. The opening of the source code thus opens the possibility of creating a multitude of new solutions based on the previous knowledge, which is a special opportunity for producers of software which are recently emerging on the international market.

The second aspect of the discussion on the use of open source good and free software deals with the search for more efficient and effective software for different types of organization. The total cost of the ICT systems, for example, continues to be too high for many users and institutions in low-income countries. In addition to the Internet access and hardware costs there is a cost that is difficult to estimate: the cost of rapid obsolescence of these systems. One decision by the producers of hardware and software can lead to the loss of all the investments that are being made today, if the new systems are not interoperable with the previous ones or simply require different hardware. Moreover, only 10% of the total value of ICT is due to the price of the firmware, while the other 90% is due to the software and labour costs of staff trained to install and maintain the new systems (IDC, 2002).[53] There is thus not only the risk of losing the 10% corresponding to

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registration for software, although copyright and patents are two different models for protection of intellectual property. In the case of copyright, the form is protected but not the idea (for example, this was one of the reasons that Microsoft was able to win a legal battle with Apple in the case Mac versus Windows). In the case of invention patents, the entire software programme is protected, which means that the subprogrammes, routines and subroutines could also be protected, which, given the complexity of the software, generates risks of protecting knowledge that is in the public domain.

[52] The supporters of the proprietary software model argue that the bet way to give incentives for the production of new digital tools is the protection of the source code of the creator, so that the investments can be recovered and additional earnings will make it possible to develop new generations of software based on the programming secrets.

[53] There are two additional consequences. As the output of one piece of software may be an input for another piece of software, there is a tendency to disseminate and extend the ability to programme software as costs fall. Meanwhile, as software for writing software already exists, one significant component of the total preparation cost is reduced.

the investment in hardware and software, but also the 90% for staff training. Extending the life cycle of the hardware and software, quality, interoperability, diminishing the risks of technological dependency and capture, and increasing the capacities and reducing the costs of software development are significant challenges. It is in this context that the demand for open standards is growing, and the demand for open source code software, which can be used gradually to build common and shared solutions.

The third aspect in the discussion of this topic is the degree of competition in a software market. The more market power that a providing company has, the more probable it is that its product will become a de facto standard, generating dependence in the rest of the market. At present, some markets, especially those for operating systems, are dominated by the solution of a single provider of proprietary software with a closed source code.

In theory, this situation could also exist in a market that is exclusively using open source code software, although when the software is free, that is, protected by GPL, it is impossible for the provider to have monopoly rents. Whether the source code is open or closed, from the economic point of view, in a market where the investments in research and development have already been recovered, competition is "the best way to drive down prices and to ensure the ongoing modernization of networks and services".[54]

It is estimated that of the 43.5 million Internet users in the region, 2.2 million (5.1%) use the Linux system, an open source code software; it has significant penetration only in Cuba (a little over 20% of Internet users) and in Brazil and Paraguay, where the figure is close to 9%.[55] Its market share is too small to be considered a serious competitor. Taking into account that software spending is a significant item for a country (around 2% of GDP in the countries of Latin America in 2001)[56], the increase in competition and the search for alternative models is of interest for the dissemination of ICTs.

[54] Bávaro Declaration, 2.(f).

[55] Data from ECLAC (2005b), based on *The Linux Counter*, http://counter.li.org/ and ITU (2004).

[56] Brazil: 3.7%; Colombia: 2.1%; Chile: 1.7%; Argentina: 1.5%; Venezuela: 1.4%; Mexico: 1.0%. Source: author's calculations, based on WITSA (2002).

Contents and public applications

The new paradigm may have a profound impact on the State, as its functioning involves the consumption, storage, processing and distribution of information on scales that no enterprise of private entity can reach. The work of the legislative power of a representative democracy is based almost entirely on flows of information and communication processes, either between the representatives of the people or among the citizens. The digitalization of this information may facilitate and enhance the efficiency of the work of the legislators. In Brazil, for example, there is a high-velocity digital network INTERLEGIS, which facilitates communication among the three levels of the legislative power (federal, state and municipal) to coordinate their work, make it more efficient, and encourage citizens´ participation in the legislative process.[57] Intensive use of ICTs in the judicial power is still very limited, although the use of secure servers and advanced digital signature systems could bring greater efficiency and security in file management and reduction in the costs of paperwork and related areas. In Colombia, the judicial branch has a portal which can be used to consult on current proceedings, jurisprudence, legislation and statistics on judicial management.[58] The executive branch has made the greatest progress in incorporating ICTs into the performance of its tasks. In this section, four important areas of ICT use in government are considered in detail: electronic public administration, electronic education, electronic health and disaster management with the support of digital tools.

Electronic public administration

Many countries in the region have taken the public applications as a flagship for their national strategy to construct an information society, aiming to induce the mass adoption of ICTs in the eocnomy and society. “Government Internet presence can be a showcase of the potential and benefits of connectivity, providing an inspiration to others”.[59] By digitalizing their own processes and functioning, the government and its officials enter into a learning process, discovering the subtleties and requirements for facilitating digital interaction, such as the need for reliable and safe

[57] See www.interlegis.gov.br.
[58] See www.ramajudicial.gov.co.
[59] *Agenda for Connectivity in the Americas and Plan of Action of Quito*, p. 21.

environments, universal access and user training. This experience can serve as a catalyst and extend the use of ICTs by the private sector and by society.

The use of ICTs online is more common in government procurement, payment of taxes, social security services, civil or commercial registry services, customs and migration, and others. The digitalization of administrative processes increases their efficiency, providing an efficient and user-friendly service for the citizens, and can contribute to enhanced transparency. The digital record of the information from these processes can be a mechanism to combat the waste of resources and corruption.

Some countries of the region have advanced solutions (see table 1 of the annex). Five of them, Argentina, Brazil, Chile, Colombia and Mexico, are among the 25 most advanced in terms of government Internet presence, even surpassing Japan, Spain, Portugal and Italy.[60] There are also countries in the region which are among those lagging most behind in the world. They all, however, with the exception of Haiti, have at least a national plan for electronic government.

In order to take advantage of the knowledge of the more advanced countries in the region, networks have been created for the exchange of experiences on electronic government in a process of intraregional cooperation, which may develop towards the transfer of technologies, shared use of platforms, applications and their corresponding knowledge and capacities.[61]

Electronic education

Many countries of the region have significantly expanded the provision of computers and Internet access in schools, but they under-utilize the technological infrastructure and have problems with progressing beyond the connectivity of establishments towards the development of adequate contents for education. The existence and maintenance of educational portals are important for taking advantage of the potential of ICTs. By 2003, 76% of the teachers in Chile had used the Educarchile portal and 49% had downloaded information for classroom use (PUC, 2003).

International cooperation on electronic education has a long history, with projects such as *I*Earn*[62] and *WorldLinks*.[63] In the area of digital content, advantage can be taken of the economies of scale and environment inherent in ICTs. Unlike other regions of the world, the educational systems in Latin America and the Caribbean are based on a small number of languages, which facilitates the exchange of educational contents and scientific applications, such as mathematics or natural sciences. The programming of multimedia educational software can cost millions of dollars; the cost of reproducing it, however, is practically zero. Some countries of the region have been working for almost a decade in the production of high quality educational contents, and there

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60 The 6th and 11th places occupied by Chile and Mexico, respectively, and the progress in Colombia, which moved up from 54th to 23rd place in 2004, show that the region is capable of leapfrogging in relation to ICTs.

61 See, for example: Electronic Government Network of Latin America and the Caribbean, http://www.redgealc.net; Conference on ICT and E-Government for Regional Development and Integration in Central America, November 2002, Tegucigalpa, Honduras, http://www.unpan.org/conference_egov-centralamerica02.asp; Working Group on Electronic Government in Central America: First Meeting, August 2003, Tegucigalpa, Honduras, http://www.unpan.org/directory/conference/guest/browseoneconference.asp?conference_id=1739.

62 I*Earn was established in 1988 and is a non-profit organization which links 4000 in over 100 countries: http://www.iearn.org/.

63 WorldLinks was established in 1997 and links 20,000 teachers and students in 22 developing countries: http://www.worldbank.org/worldlinks/.

is a Latin American network of educational portals in which 17 countries participate.[64] This network was inaugurated during the first Meeting of Ministers of Education of Latin America on Education Technology, in August 2004; so far, however, only five are contributing actively with content.

This network seeks to facilitate the exchange of content produced in the different countries with public resources. Obviously, not all of the contents are suitable for a particular country; accordingly, the network mechanism involves advising the administrators of the national portals when new contents are uploaded to some portal of the network, leaving it to each administrator to decide whether to include those contents in the national portal. The special features of each national curriculum are thus conserved and duplication of effort is avoided. Thanks to this network, there is the opportunity for countries with little experience in creating digitalized educational content to have a portal with a large variety of applications from the very first day of operation.

For many countries, the integration of digital educational content into curricular practice is a growing concern; some ministries of education have considered the topic and incorporated chapters on the use of ICT in the national curriculum (see table 2 of the annex).[65]

The virtuous circle of providing access to ICTs, the creation of capacities and effective use of suitable content has not yet been closed. Meanwhile, the most effective solutions to ensure the incorporation of ICTs in the daily practices of education are the continuous education programmes and professional development for teachers, improving their training in ICTs. "The introduction and development of ICTs in various schools and other learning institutions shall be supported through the establishment and maintenance of a human resources network that institutionalizes the ongoing training of teachers and instructors, who are the backbone of innovation".[66] In this context, teachers and teacher training institutes in some countries are developing models for ICT integration in the lecture course designed for their peers

Electronic health

The health sector makes intense use of information flows and communication processes. Health systems are complex, their administrative costs are very high, transparency is low and the services are concentrated in urban areas. The sectoral services and the administration of their systems can make use of digitalization to manage the information and make efficient use of the sector's resources. The largest contribution of digitalization in the health sector is probably the reduction in information asymmetry between the entities in the sector and the increase in transparency, for example, avoiding duplicate or unnecessary tests, which results in cost reductions and quality improvements. It is not possible to increase transparency without a reorganization of processes, which, although it begins with the flows of information, finally goes beyond the digital and meets with the customs and habits of those involved.

Although the main efforts in administration of the sector have been in the back office, there is also potential for patient interaction in the front office. Digital technologies are being increasingly used by citizens to obtain medical information on diseases or to educate themselves

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[64] Some of these portals are in Argentina www.Educar.ar; Chile www.Educarchile.cl; Colombia, www.colombiaaprende.edu.co; Ecuador www.Educarecuador.ec; and Mexico, www.sep.gob.mx. Information from the Institute for Connectivity in the Americas (ICA) and the Inter-American Development Bank (BID).

[65] See also *WSIS Plan of Action*: "6. Based on internationally agreed development goals [...] indicative targets [...] to be achieved by 2015. [...] 6.(g) to adapt all primary and secondary school curricula to meet the challenges of the Information Society, taking into account national circumstances."

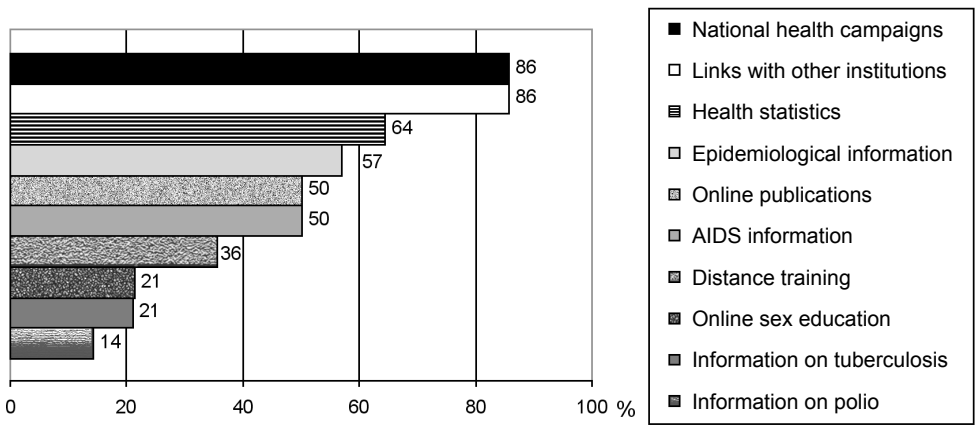
[66] Bávaro Declaration, 2.(p).

on health matters. "Technological convergence has gradually enabled affordable services to be made available, which have the potential to revolutionize health care." So far, however, electronic health in the front office has been little developed in the region and "in some countries telehealth has thus far been assigned secondary importance".[67]

The number of records and the percentage of GDP which is spent on health and pensions give an idea of the magnitude of the problem that information systems need to resolve in this area. Some countries of Latin America and the Caribbean are facing the need to correct problems which are eroding their budgets, preventing them from offering the coverage that the population needs. Many times, the origin of these problems is the lack of timely and accurate information. Often, advantage is taken of the lack of information control in order to claim benefits improperly or to take the place of legitimate beneficiaries. The same occurs with dishonest providers to hospitals and public services which charge for medicines, treatments or equipment at prices several times higher than market prices. The ICT solution to these problems requires the formulation of a state information policy which considers aspects as different and delicate as information on identity, the clinical and labour history of individuals, the guarantee of the right to privacy, standards for the interoperability of information between private laboratories and public health systems, and standards for the administrative control of health treatments and services. Lastly, for the regional and subregional integration of public systems of social protection, it is necessary to standardize the exchange of information between countries so that when a person in one country requires health services in another, the provider country has timely access to the information required for the treatment and to recover the cost.

At present, the ministries of health do not play an active rule in almost any of the national strategies for the information society; the potential of technology to fight epidemics and diseases is not being utilized (see figure 11). In contrast with the commitment made in the WSIS Plan of

FIGURE 11
CONTENTS OF THE PORTALS OF THE MINISTRIES OF HEALTH IN LATIN AMERICA, 2004
(Percentages, 16 countries)



Source: OSILAC, 2005, on the basis of Ministry of Health and the Environment of Argentina, www.msal.gov.ar; Ministry of Health and Sport of Bolivia, www.sns.gov.bo; Ministry of Health de Chile, www.minsal.cl; Ministry of Social Protection of Colombia, www.minproteccionsocial.gov.co; Ministry of Health of Costa Rica, www.netsalud.sa.cr/ms/; Ministry of Public Health of Cuba, www.cubagob.cu/des_soc/salud/; Ministry of Public Health of Ecuador, www.msp.goc.ec; Ministry of Public Health and Social Assistance of El Salvador, www.mspas.gob.sv; Ministry of Public Health of Guatemala, www.mspas.gob.gt/CMS; Secretariat of Health of Mexico, www.salud.gob.mx; Ministry of Health of Nicaragua, www.minsa.gob.ni; Ministry of Health of Panama, www.minsa.gob.pa/home.htm; Ministry of Public Health and Social Welfare of Paraguay, www.mspbs.gov.py/index.htm; Ministry of Health of Peru, www.minsa.gob.pe/index2.asp; Ministry of Public Health of Uruguay, www.msp.gub.uy; Ministry of Health and Social Development of Venezuela, www.msds.gov.ve/msds/index.php.

[67] Agenda for Connectivity in the Americas and Plan of Action of Quito, p. 16.

Action,[68] only one third of these ministries provide online health education services on health topics and only one fifth of them provide interactive information on reproductive health.

The challenge for the region is to create and maintain health information networks, connect establishments, legislate on the use of electronic health and integrate the health ministries into the agendas for connectivity and information society strategies.

Disaster management

The countries of the region are vulnerable to weather-related disasters (hurricanes, tropical storms and floods) and geological disasters (earthquakes, volcanic eruptions or landslides). For this reason, priority has been given to the creation of preventive information networks and, in many of them, especially in Central America and the Caribbean, these systems play a crucial role, not only in saving lives, but also in maintaining the economic infrastructure. These networks are important for reducing the impact of disasters, detecting threats, mitigating heir effects, reacting to events and recovery. The management of natural disasters with the help of real-time digital networks is a central part of the ICT strategy of CARICOM (Marcelle, 2004b).

In the countries of the region, there are national prevention, management and information systems which provide information on earthquakes, floods, hurricanes, volcanoes, tsunamis and tidal waves, forest fires, landslides and droughts (see figure 12). Efforts are also being made to interconnect these networks and create subregional and regional information networks.[69]

In some cases, these networks use state-of-the art technology with sophisticated digital applications. The National Centre for Disaster Preparedness (CENAPRED) in Mexico, together with the Universidad Nacional Autónoma de México (UNAM) and the United States Geological Survey have a real time application for monitoring the Popocatépetl volcano that provides satellite images and other products on its website. More than five million people have already accessed this service.

However, for this ICT application, public policies require an integrated approach to the provision of contents, access and user training. High quality contents with real-time information have little impact if the population cannot be informed on a timely basis. Given the low penetration of Internet and the lack of computer equipment in strategically important places, such as emergency

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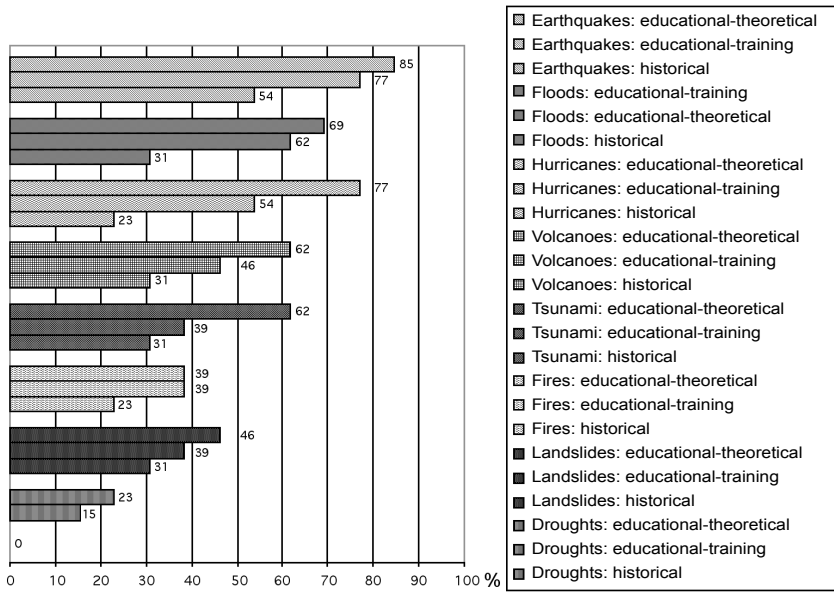
[68] *WSIS Plan of Action*: 18 E-health: "a) Promote collaborative efforts of governments, planners, health professionals, and other agencies along with the participation of international organizations for creating a reliable, timely, high quality and affordable health care and health information systems and for promoting continuous medical training, education, and research through the use of ICTs, while respecting and protecting citizens' right to privacy. b) Facilitate access to the world's medical knowledge and locally-relevant content resources for strengthening public health research and prevention programmes and promoting women's and men's health, such as content on sexual and reproductive health and sexually transmitted infections, and for diseases that attract full attention of the world including HIV/AIDS, malaria and tuberculosis."

[69] *Seismic Research Unit* of the *University of the West Indies*, which has had a network of many seismographic stations in different countries of the Caribbean since 1952 (www.uwiseismic.com); Regional Disaster Information Centre (CRID) (www.crid.or.cr); Network of Social Studies on the Prevention of Disasters in Latin America (La RED) (www.desenredando.org); Disaster Office for South America of the Pan American Health Organization (PAHO) (www.paho.org/desastres); Coordination Centre for the Prevention of Natural Disasters in Central America (CEPREDENAC) (www.cepredenac.org); International Strategy for Disaster Reduction in Latin America and the Caribbean (EIRD) (www.eird.org); Caribbean Disaster Emergency Response Agency (CDERA) (www.cdera.org); Caribbean Disaster Information Network (CARDIN) (wwwcardin.uwimona.edu.jm.1104).

FIGURE 12
CONTENTS OF THE PORTALS OF NATIONAL INFORMATION AND DISASTER-PREPAREDNESS CENTRES, 2004
(Percentages, 13 countries)



Source: Observatory on the Information Society in Latin America and the Caribbean -OSILAC, 2005, on the basis of SIFEM –the Federal Emergency System– National Directorate for Policies on Security and Civil Protection (Argentina), National Emergency Management Organization (Belize), National Emergency Office (ONEMI) (Chile), General Directorate for Disaster Prevention and Response (DGPAD) (Colombia), National Commission for Risk Prevention and Response to Emergencies of Costa Rica (CNE), Civil Defence (Ecuador), National Emergency Committee (COEN) (El Salvador), National Coordinator for Disaster Reduction (CONRED) (Guatemala), Office of Disaster Preparedness and Emergency Management (ODPEM) (Jamaica), National Centre for Disaster Preparedness (CENAPRED) (Mexico), National System for Civil Protection (SINAPROC) (Panamá), National Emergency Commission (Dominican Rep.), Civil Protection and Disaster Administration (Venezuela).

shelters, one-way technologies (television and radio) are the solutions most frequently used, including for training people.[70] As already mentioned, the mobile telephone is the ICT with the widest market penetration. On the strength of this infrastructure, the response to Hurricane Ivan in Barbados was coordinated to a large extent using cell phones in the communities (CIVIC, 2004). In the United States, this new alternative is used systematically; the Cellular Alert System is used to alert the entire population with access to this technology in case of a threat.[71] Cell phone operators should now be required to construct base stations that can withstand hurricane-force winds of up to 200 miles per hour.

[70] The International Strategy for Disaster Reduction (EIRD), the Pan American Health Organization/World Health Organization (PAHO/WHO), the International Organization for Migration (IOM) and the Coordination Centre for the Prevention of Natural Disasters in Central America (CEPREDENAC) have produced a joint radio broadcast consisting of a radio play concerning the threat of natural disasters.

[71] www.ceasa-int.org.

Instruments: incentives and public regulation

Financing

Financial resources are required for constructing ICT infrastructure projects, creating skills and facilitating access to knowledge, for digitization of processes, the provision of public services through digital networks and even for ensuring the operation of the coordination mechanisms that are necessary for establishing the institutional framework for a national strategy for the information society.

The countries of the region have given priority to digital development; this is reflected in relatively high expenditure on ICT in relation to GDP. However, low income levels and poor income distribution prevent them from following the lead of developed countries in their progress towards information societies. The developing countries are not in a position to allocate the same level of funding to ICT as to areas such as health, education or public security. As stated by the Task Force on Financial Mechanisms for ICT for Development set up at the World Summit on the Information Society, the resources available in the developing countries are not sufficient to sustain the development of an information society for all (TFFM, 2003).

But the scope for financing may expand bearing in mind: (i) private spending occurring outside of public intervention and directed specifically at ICTs; (ii) private spending prompted by signals from the public sector that do not involve State funds; (iii) public spending including direct State operations and subsidies and support measures with public funds, and (iv) spending with support from international financing and assistance (ECLAC, 2005a).

To date, the bulk of investments in ICTs have come from the first source, that is, the private sector. Financial instruments include all private consumer credit and investment modalities, leasing operations, private investment funds, risk capital, as well as foreign direct investments and credit from private foreign investment entities. Following the slump in technology markets in 2000-2001, private-sector investment in ICTs declined sharply. Although, four years later, there are signs of recovery, it is important to ensure that regulatory, political and legal frameworks remain stable, transparent and predictable, are conducive to competition and investment and create the appropriate incentives for increasing private investments.

Furthermore, several countries in the region may use a variety of public financing and regulatory instruments to encourage private investors to contribute to an information society that

promotes inclusion and social cohesion. These include rate regulation, tax incentives, tariff reduction or mandatory tax mechanisms, such as universal access funds (financed by between 1% and 5% of the revenue of telecommunications operators) and sectoral technological funds (financed by budget or private contributions), which are used to increase investments in science and technology, training, and research and development (ECLAC, 2005a).

Many of these instruments, for example, the universal access funds, must be reviewed in the light of technological progress. These funds have been widely used to subsidize traditional telephony, especially fixed telephony, and very few have been used for new technologies, such as wireless solutions suitable for remote or rural areas. Few countries have reviewed the functionality, efficiency and purpose of the universal access funds or have placed emphasis on their being flexible enough to finance the information society.

It should also be borne in mind that universal access funds are sectoral funds that are supplied by telecommunications operators, which, in theory, must be the beneficiaries of such funds. In some countries, however, these funds are used to finance the establishment of complete public access centres involving expenditure on hardware, software, physical infrastructure and furniture. Thus, the software and hardware companies may receive an implicit subsidy from telecommunications operators, through the sale of their technological solutions to social projects financed by the telecommunications funds.

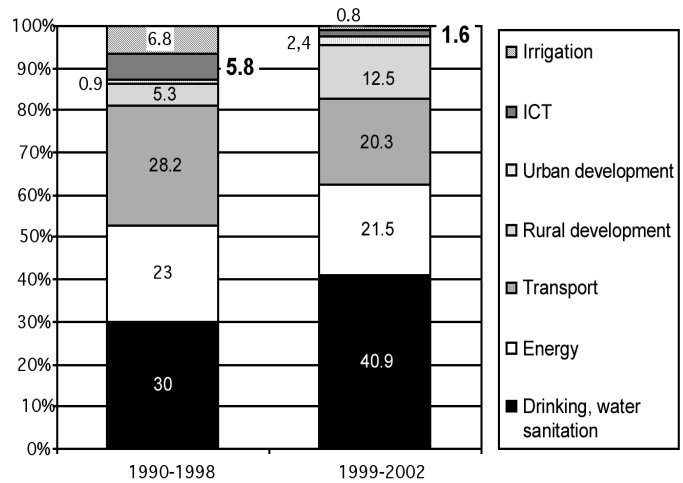
The last source to take into consideration is international financing, an issue that was the subject of intense debate during the first phase of the World Summit on the Information Society. This refers primarily to credits and grants from multilateral agencies, official development assistance-type grants (ODA) for specific projects and programmes with a demonstrative impact or new initiatives discussed at the World Summit on the Information Society, such as the digital solidarity fund, new debt swap modalities explicitly incorporating investments associated with the information society and similar mechanisms for financing other global public goods.

Despite its importance for development, ODA has diminished in the last decade. Many donor countries withdrew the official assistance they were providing for infrastructure construction because it was expected that the private sector would take over. In 2000, the Governments of Latin America and the Caribbean recognized in the Declaration of Florianópolis that "allowing the evolution of the information and knowledge-based society to be guided solely by market mechanisms entails the risk of an amplification in the social gaps existing within our societies, the creation of new modes of exclusion, an increase in the negative aspects of globalization and a widening of the distances between developed and developing countries".[72] Although countries recognized the challenge, the resources they allocated to external assistance for the development of ICTs were declining steadily. Between 1990 and 1998, 5.8% of infrastructure ODA was earmarked for the development of ICTs and between 1999 and 2002, the figure was down to 1.6% (see figure 13).

Thus the challenge for donors is to recognize that, left to itself, the private sector will not invest in marginal areas in order to reach isolated populations; for their part, recipient countries must channel available funds towards the development of an information society for all.

[72] Declaration of Florianópolis (2000).

FIGURE 13
BILATERAL ASSISTANCE FOR INFRASTRUCTURE, BY SECTOR OF ACTIVITY
1990-1998 and 1999-2002



Source: Development Assistance Committee (DAC) "Financing ICTs for Development, Efforts of DAC Members", Review of Recent Trends of ODA and its contribution, Paris, 2005.

The regulation sphere

In the 1980s and 1990s, the region was at the forefront of the process of privatization of the telecommunications sector in the world, so much so that, by 2000, 74% of the operating companies had been privatized, compared with 63% in Europe and 53% in Asia/Pacific (ITU, 2001). At that time, the challenge was to establish frameworks and regulatory entities, a process that has been relatively successful, although it is not yet complete.[73] In many countries, the time when incumbent operators could claim exclusivity is past.[74]

Competition is tending to increase in some segments of telecommunications for historical reasons and as a result of regulatory policy. Cell-phone and value-added service markets –for example, Internet– have operated under stiff competitive pressure, while the markets for fixed telephones continue to be highly concentrated, although in several countries, competition has increased in high and medium traffic markets.

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[73] There are three countries, where the telecommunications sector has not been privatized: Cuba, Uruguay and Costa Rica. Nevertheless, there are significant differences in the development of this sector. Indeed, Costa Rica and Uruguay are the countries which have pushed the penetration of fixed telephones the furthest, which gives them a solid base from which to expand broadband Internet service in the future.

[74] The provision of the following services on an exclusive basis came to an end on the following dates: Argentina (local and long-distance fixed service): 1999; Bolivia (duopoly in local fixed service and oligopoly with four long-distance competitors): 2002; Brazil (local fixed, long-distance and mobile, duopoly in each region): 2002; Colombia (There was a monopoly until the sector was opened up legally, but there was no exclusivity as an instrument of privatization): local competition in 1994, end of the long-distance monopoly in 1998; Ecuador (fixed local and long distance): 2001; Honduras (fixed): 2005, (mobile): 2003; Mexico (fixed local and long-distance service): 1997; Nicaragua (fixed): 2004; Panama (fixed): 2003, (mobile duopoly): 2007; Peru (fixed): 1998; Bolivarian Republic of Venezuela (fixed local and long distance): 2001. Hispano-American Association of Research Centres and Telecommunications Corporations – (AHCIET, 2003).

One of the consequences of this process would appear to be the erosion of market power and of profits of incumbents. A comparison with Asia suggests that there is still room for reducing telecommunications costs and that this can be done through the efficient application of regulatory frameworks. This is more of an undertaking for some markets and subregions than for others; in the Southern Cone countries, appropriate regulatory measures were used to bring telecommunications access prices to levels that are among the lowest in the world.

Technological advances and new public policies for the construction of information societies have a strong impact on ICT regulatory frameworks. Although these technologies –which include heterogeneous sectors such as communications and information and content technologies– are, in the most general way, in a process of technological, market, services and possibly regulatory convergence; this is not a one-way process. Often, technological and market uncertainty leads to situations where, far from having convergence, there is actually divergence and disintegration.[75]

One of the consequences of technological progress has been the break with the "one technology – one service" paradigm. Currently, similar services can be provided through different access media or different services can be provided using a single access medium; thus, regulation must be geared to the service, not to the technology of each sector.

The scope for convergence or, possibly, divergence has brought increasing pressure to bear on various aspects of the regulatory model that emerged in the last decade. Although, in theory, a regulatory framework can include objectives such as universal access and fostering competition, in the telecommunications infrastructure, there is often concentration of control of proprietary dedicated networks, which lead to businesses based on vertical integration. This means that, when there is monopoly control of access networks, this monopoly tends to be extended to services provided through such networks.

The regulatory models existing in the region are still incomplete and are often inappropriate for dealing with objectives such as incorporating more recent technological advances and bridging the digital divide. Hence, there are discussions on the allocation of radio frequencies, the unbundling of networks and the facilitation of the entry of operators of new technologies. In these debates, the aim is to liberalize and introduce more competition into services, deploy Internet protocol (IP) telephony and improve rate-setting and regulatory institutions, control and competition, these being elements linked to the persistence of strong economic concentration. These subjects are crucial for improving access; the deployment and potential of new technologies may be hindered by the presence of regulatory, institutional or administrative barriers which make it difficult to bring down the costs of telecommunications in the interests of universal access. The debate is opening up alternatives, such as advancing towards convergence in the area of regulation which would simplify the role of the regulator and increase competition in the services market.

The challenge is to generate policy proposals in order to improve regulatory frameworks that can cope with technological and business convergence and to move in the direction of cost reduction and inducements to firms to continue investing. In this respect, the experience of the more advanced countries in South America can be useful for sharing knowledge with countries that are still in the process of bringing their policies to maturity. The Caribbean Community (CARICOM) and other subregional organizations, such as the Caribbean Telecommunications Union (CTU) have reiterated the need to establish frameworks that provide certainty in a competitive environment in order to reduce the costs of services and ensure the continuity of investments (see table 3 of the Annex).[76]

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[75] See, for example, Henten, Samarajiva and Melody (2002).

[76] See the Georgetown Declaration, February 2003, and CARICOM (2003).

Legal Framework

Prior to the ICT revolution, the production and distribution of information and knowledge was based on a technological paradigm to which institutions, regulations, conventions and legal frameworks were adapted. The shift to the new digital mode of production and ditribution rendered the existing institutional framework quite inadequate. Much of the implementation of public policy will involve modifying that institutional framework, with the initial focus being on the public sector itself insofar as it is both the promoter and the object of the transformation.

If ICTs are to have an impact on the organization of production and of society, it is imperative that communication and digital transactions take place in a climate of security and confidence. Amont the policy initiatives related to this aspect, most prominent are measures to guarantee the authenticity of electronic documents, the protection of privacy and of the confidentiality of personal and business records, participation in the establishment of acceptable international standards, and recognition of electronic documents, digital signatures and certification authorities, as well as certification of the quality of products and services on digital networks, legal resources for resolving disputes and the management of information overload and unsolicited email (spam). Most countries in the region already have one or more laws and decrees governing these matters (see table 4 of the annex).

In subregional groups such as the Andean Community, Mercosur, Central America and the Caribbean, efforts are being made to harmonize legislation internally, given the historic ties that bind these countries and their growing economic integration. The Andean Community has made progress on digital signatures and electronic contracting, while Mercosur has advanced further on privacy protection. Central America and the Caribbean may take advantage of their latecomer status, avoiding the mistakes made by other countries in revising their legislation and drafting legal frameworks better suited to their circumstances to eliminate barriers to digital interaction.

Among the important standards for moving towards an information society is Freedom of Information (FOI) legislation, which includes measures to enhance citizens' access to information in the public domain, taking into consideration reasonable use for private, educational and scientific purposes. This type of legislation is intended to create a situation in which the provision and distribution of information under State control is the rule, and official secrets the exception. Under such laws, the citizen has the right to obtain information and the State must provide justification for not providing it, such as reasons of national security. Without this type of legislation, the citizen would have to justify his need for the information.

Several countries in the region have FOI legislation (see table 5 in the annex).[77] The use of ICTs to facilitate the implementation of this legislation is still incipient. Some countries use websites to provide general information to the public, while others permit the use of email to disseminate public information. The full potential of this legislation to promote a transparent public sector by increasing democratic control by the citizenry and preparing them for more active democratic participation has not yet been reached. Although some Governments in the region are beginning to place their FOI legislation at the center of their electronic government strategy, or in some cases, their national strategy for the information society, there is still much legislative work to be done to adapt these legal norms to the new technological possibilities.

Measurement and follow-up

In the Declaration Florianópolis of 2000, the nations of the region pledged to "promote the creation of a regional observatory to monitor the impact of information technologies on the economy and

[77] In Colombia this legal concept has existed for over 115 years.

other related cooperative measures".[78] Five years later, several initiatives are awaiting action in order to carry out that follow-up. Some of them are qualitative observatories that serve as centres for news announcements and the exchange of experiences. Newsletters, emails, informational portals and interactive discussion groups are among the efforts being made by international organizations (such as UNESCO and UNDP), civil society, universities, research centres and the private sector.

That same year, the Observatory for the Information Society in Latin America and the Caribbean (OSILAC) was formed pursuant to a mandate of the Statistical Conference of the Americas (SCA).[79] Its principal objectives are: (i) to centralize data, indicators, methodologies and qualitative information from the entire region; (ii) to standarize and harmonize ICT indicators compiled on the subregional, national and local levels; and (iii) to increase and improve the quantity and quality of ICT data reported for the region. Among the products of its first years of operation is a report on monitoring and benchmarking of the WSIS Action Plan, which contains 120 charts and tables illustrating progress made in implementing the 29 articles adopted by the international community. Within the framework of the SCA, OSILAC, along with the National Statistics Organizations (INE),[80] has identified and formulated eight key questions, and in November 2004, it recommended that these questions be incorporated into household survey questionnaires. It has also developed five key questions for surveys of businesses and economic establishments (see table 6 in the annex).

The harmonization of indicators within this region and also with other regions of the world is essential for understanding trends and differences in development patterns of the Information Society, in keeping with national characteristics. In light of this need, the INEs of Latin America and the Caribbean carried out the exercise in OSILAC in conjunction with a global cooperation group consisting of nine organizations of the United Nations, the World Bank and OECD. This effort culminated in lists of similar indicators recommended by Africa, the Arab countries and Asia Pacific. During the parallel event held by WSIS on Information Society Measurement in Geneva in February 2005, a global list of key questions was agreed upon, giving particular consideration to the needs and characteristics of developing countries. These materials can now serve as recommendations and models for the incorporation of questions on ICTs in various questionnaires.[81]

In addition, the telecommunications sector, together with the International Telecommunications Union (ITU), the Latin American Forum of Telecommunication Regulatory Bodies (Regulatel) and the Inter-American Telecommunications Commission (CITEL), is constantly working on harmonizing ICT infrastructure indicators. Achieving compatibility of these supply indicators, drawn from administrative records, with demand indicators, produced by National Statistics Organizations on the basis of questionnaires, is a challenge currently facing many countries in the region.

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[78] During WSIS, the international community declared that "all countries and regions should develop tools so as to provide statistical information on the Information Society, with basic indicators and analysis of its key dimensions. Priority should be given to setting up coherent and internationally comparable indicator systems, taking into account different levels of development" (*WSIS Action Plan,* E, 28f).

[79] During the second meeting of the Statistical Conference of the Americas (SCA) of the Economic Commission for Latin America and the Caribbean in June 2003, it was announced that OSILAC would be established based on an agreement between ECLAC and the Institute for Connectivity in the Americas (ICA), (ECLAC, 2003b, 58, p. 16).

[80] For this purpose, a questionnaire on metadata was developed in conjunction with all the INEs of the region. The following organizations participated in the Workshop on Information Society Measurement for Latin America and the Caribbean, Santiago, Chile, 3-4 November 2004: INDEC (Argentina), BARSTATS (Barbados), CSO (Belize), INE (Bolivia), IBGE (Brazil), INE (Chile), DANE (Colombia), INEC (Ecuador), DIGESTYC (El Salvador), STATIN (Jamaica), INEGI (Mexico), DGEEC (Paraguay), INEI (Peru), ONE (Dominican Republic), INE (Uruguay), INE (Bolivarian Republic of Venezuela), National E-Commerce Secretariat (Trinidad and Tobago), OECD, ITU, RICYT, UNESCO, ICA and ECLAC. In addition, the Comitê Gestor da Internet no Brasil, LACNIC and Social Watch were present.

[81] The conclusions of the thematic meeting of the WSIS on Information Society Measurement and the list of proposed indicators can be found at: http://measuring-ict.unctad.org/QuickPlace/measuring-ict/Main.nsf/h_Toc/30B3234BF0C98509C1256F5700692D89/?OpenDocument.

Strategic guidelines and their policy implications

The State's interest in ICTs stems from the goals of transforming society so that it can make intensive use of information with an emphasis on equitable economic development, and undertaking the digital transformation of the State itself with a view to promoting transparency and efficiency. Both processes can give rise to public policies that can achieve their potential through more intensive regional cooperation.

The design of public policies should take into account that access to ICTs is a moving target, given that the cycle of innovation in digital technologies is short and the diffusion curves of technological solutions follow quickly one after another. The result is a permanent state of inequality, while at the same time new opportunities are constantl opening up to leapfrog the adoption of specific technological solutions to expand the scope of possibilities for access.[82] Public intervention is necessary but difficult and complex, given the characteristics of the technology and the shortcomings of government itself. Just how difficult varies considerably from country to country and from time to time, and incentive and regulation measures, i.e., public policy instruments, have varying impact as well. It is impossible to say before the fact which will prevail. Although it may be politically desirable for incentives (direct or cross subsidies) to predominate, there is good reason to believe that regulations, in the generic sense of the term, have a fundamental role to play.[83]

Consolidation of national strategies

In the last few years, nearly all countries in the region have made progress in developing national strategies for the Information Society (IS), which have become an important part of their development policy agendas (see table 7 in the annex). In many cases, the first step in building a

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[82] The digital revolution involves the continual generation of new products and services, with successive overlapping cycles of innovation. History shows that as soon as society achieved universal access to analog radio and TV, computers, Internat access, and cellular telephony arrived on the scene, with digital radio and TV following on their heels, along with many digitized devices that could be connected to the Internet. See Hilbert and Katz, 2003, p. 46.

[83] Regulation plays an important role in: (a) changing consumer preferences or businesses' production functions by inducing them to use certain technologies and shortening the diffusion period of these

national strategy for the IS has been the appointment and legitimization of a working group at the highest possible level. The Agenda for Connectivity in the Americas and Plan of Action of Quito emphasize this need.[84] In many countries there is a division of labour between the authority in charge of strategic orientation, which is broad in scope and relatively high up in the hierarchy (often an inter-ministerial committee or a high-level council in the President's Office), and officials in charge of specific areas and operations in ministries or secretariats.

Although the majority of countries in the region are pursuing some type of strategy, they are still at the stage of talking about designing or formulating public policies; efforts to promote specific projects, implement them and evaluate their impact are still lacking. Recognizing that the task of implementing coherent, effective and operational national strategies in Latin America and the Caribbean is still far from completion, the challenge remains to involve all relevant public actors and encourage meaningful participation in the formulation of national strategies. One indication of the magnitude of the challenge is that, as noted previously, even though the region recognizes the possible positive contributions ICTs can make to the development of healthcare services, only a handful of health ministries are actively participating in national strategies (Hilbert, Bustos and Ferraz, 2003).

Furthermore, mechanisms for coordination among public officials and between them and the initiatives of civil society have not yet been consolidated. Efforts are being made in that regard; thus, although education authorities are not in charge of the national coordination of ICTs in any national strategy in the region, many of these authorities created networks years ago and are maintaining them. Examples include the Omar Dengo Foundation in Costa Rica, which is linked to the Education Ministry and has been operating since 1987; and the "Enlaces" Programme in Chile, in operation since 1990 and linking the Education Ministry to a group of public and private universities, private sector organizations and foundations. "Enlaces" has been able to contribute to the country's digital development throughout three presidential administrations and the terms of seven education ministers.

The participation of civil society and the private sector in national strategies is still incipient, and few countries have promoted initiatives aimed at taking advantage of all available resources and know-how. In the Caribbean, the CARICOM Secretariat has reiterated that cooperation can help even small countries with difficult challenges make use of all existing resources in drawing up and implementing national strategies (CARICOM, 2003 and Marcelle, 2004a). In Bolivia, Colombia and the Dominican Republic, the United Nations Development Programme (UNDP) is supporting the development of participative methodologies, an effort the Inter-American Development Bank is also making in various countries of the region.

Regional coordination: a historic opportunity

The development of information societies offers unique opportunities for identifying and carrying out coordinated public policies in the region, for three reasons. First, not only is there very little

technologies (for example, through public transactions that can only be carried out on the Internet); (b) preventing market dynamics from leading to monolopy situations or increased market power because of indivisibilities, or correcting such situations that have already occurred; (c) preventing privileged or discriminatory access to networks or services that delays the diffusion of new technologies; and (d) creating conditions for the development and diffusion of the technological paradigm when these do not automatically result from the market dynamic (for example, allowing the generation and collection of technology revenues that would support innovation and that would be impossible in perfectly competitive markets).

[84] Agenda for Connectivity in the Americas and Plan of Action of Quito, p. 1.

resistance to this notion in the area of public policy, but Government plans highlight it as an important factor in development. Therefore, there is a receptiveness for placing related policies high on public agendas. Secondly, most countries have already launched important projects in this area and are developing the necessary institutions through incentive and regulation measures. There are a great variety of challenges, but they are the same or similar for every country in the region, so they can be dealt with in a coordinated manner. In the third place, the timing may not be exactly right; the countries of the region have already agreed upon specific policy declarations and WSIS is an ideal forum for delving further into accords and initiatives for cooperation and collaboration. In this regard, the regional integration of agendas for economic growth with equity and for enhancing the transparency and efficiency of the public sector can contribute to the development of information societies in Latin America and the Caribbean.

There is plenty of room for providing such opportunities in the advancement and expansion of strategies, policies and operational programmes in each country. More importantly, there is also ample opportunity for the promotion of supranational initiatives. The effort to build information societies thus represents an extraordinary chance to strengthen the development of a regionally integrated Latin American and Caribbean society.

The trend is unequivocally towards advancing the strategies, policies and programmes under way in each country and making them converge regionally in order to reduce costs, increase economies of scale, enhance mutual learning and broaden common benefits. In view of the similarity of the challenges and opportunities they face in the area of ICTs, the countries of the region have a historic chance to promote regional initiatives to accelerate their progress in building an IS, contributing to a development oriented towards inclusion and social cohesion. Concerted actions at the regional level will empower national strategies and ensure that full advantage is taken of the digital revolution to promote development. For this purpose, close cooperation between the public and private sectors as well as civil society is needed to ensure participation and to frame agreements.

During the last five years, the countries of Latin America and the Caribbean have agreed upon guiding pricniples that should pave to way to the IS. The next step should be to devise a plan of action with viable initiatives, quantitative goals and regional mechanisms for cooeration and follow-up.

Collective access: towards a regional connectivity strategy

The current diffusion pattern of ICTs in the region, the structural restrictions derived from the income distribution profile, and technology trends make it necessary to devise a different concept of connectivity from that prevailing in developed countries and also from that of countries with a very low per capita income. The latter distinction is made because the region has a medium per capita income, although there are major intra-regional disparities that require the design of policies adapted to the conditions of each country.

On the one hand, the prices of computers[85] and proprietary software must come down more quickly, and the adoption of open code software and freeware must be expanded.[86] On the other hand, considering the importance of reducing access costs and increasing the diffusion of new

[85] This effort has been carried out through two channels: zero tariffs on imports of computers and peripherals, as Mexico, Peru and Chile have done; or subsidies for connected PCs, a programme provided by the Brazilian Government. Additionally, several universities and countries (MIT, China, Brazil) are undertaking R&D projects to produce a PC with a sales price of US$ 100 in the next two to four years.

[86] For which there are a wide range of alternatives beyond the well-known Linux.

technologies, major changes in regulatory frameworks are necessary to promote the convergence of fixed and cellular telephony networks, cable television, Power Line Communications (PLC) Internet and broad-band wireless networks.

These processes are emerging in places where there are not yet any individual economic solutions for the majority of the population, especially the poorest segments or those living in rural areas, to gain access to broad band through personal computers. Until cheap solutions that integrate wired and wireless technologies are put in place, other means of access are needed, primarily collective (public or community) cost-sharing programmes. Any of the traditional or alternative technologies, or a combination of them, can be used to increase collective access. There are three alternatives:

- **Public access** centres located primarily in rural and low-income areas and financed by the public or private sector.
- Communities of medium-income users who **share infrastructure**.
- Provision of **direct Internet access infrastructure** by the public sector.

The first option involves providing access through public service centres. For nearly a decade, facilities have been opened throughout the region to offer public access to personal computers. Since the late 1990s, moreover, community Internet access facilities have been established, very few of which include Internet Protocol (IP) telephony services. The initiatives have come from the public sector (schools and libraries), ONGs and trade associations, but there has also been an increase in small business investment in collective Internet access centres.[87] The cost is shared by the users, although often there is also a public subsidy. Community access is maintained through the shared use of bandwidth and a high rate of utilization of the equipment.

The second form of collective access involves user communities located in a specific geographic area sharing infrastructure. Examples are building residents, employees of several different companies sharing a building or located in a geographic area, or students on a university campus. In high density concentrations and with a certain level of buying power, significant economies of scale and density can be achieved.

The third option is to develop strategic programmes to build public digital infrastructure, which some countries in the region have undertaken to do following the example of South Korea (ITU, 2003). Their objective is to build a broad-band, IP-based information infrastructure with a presence throughout the nation that will enable them to offer services to all public utility customers. This will directly benefit elementary and high schools, municipal governments and healthcare centers. Indirectly, it could also benefit public employees and the customers themselves, in the form of improved services and public information. In Chile, for example, the "5D Digital Highway Programme" has worked on inter-institutional coordination, the establishment of common standards and more flexible legal regulations governing public purchases of telecommunications and value-added services, which can expand collective access in public places.

Concentration of training efforts

The development of digital capacity must start from the premise that key elements in the process are interaction with the labour and social spheres and the pedagogical resources used, the latter being dictated by the perception of needs and by the incentives offered, with the condition that the infrastructure must be accessible and people must know how to access it. From the standpoint of

[87] In Latin America and the Caribbean, the terms infocentres, telecentres, Internet booths and cybercafes are used interchangeably for these facilities.

learning, the most interesting characteristics of computer training are the speed of the knowledge acquisition process and the close relationship to labour or social practice. Compared to other areas of knowledge or levels of knowledge complexity, ranging from literacy to mathematics, logic or science, computer skills are acquired more rapidly and capacity developed more quickly than any of them. Another characteristic favouring the acquisition of computer literacy is that it is not structured in a progressive system like scientific and technical knowledge, which does require different learning stages and sequences. Computer literacy allows entry at different points depending on specific needs, and is not necessarily cumulative. The effectiveness of computer training depends more on the system of social and labour relations than on the institutionalization of educational systems.

In any training process, incentives are a decisive factor; those that are put in place to expand digital capacity in a society are different from those applied in schools and universities or in job training. In these areas, receiving diplomas or certificates and remaining within the system are the most powerful incentives. In computer literacy, however, the rewards are more immediate and follow economic or social logic, taking the form of solving problems, conserving resources, lowering prices, streamlining procedures, etc. Thus, it is social and labour interactions that provide the framework for creating incentives for computer training.

The best combination of incentives is obtained when a "digital climate" is created in society, that is, when individuals perceive the benefit of acquiring digital communication skills. This perception is developed at various levels. On a basic level, people realize that it is quicker and more effective to buy products, carry out transactions, or seek information on the Internet; at a second level, they have experience with complex operations that they can do more efficiently in electronic form. Experiences at the basic level are decisive for moving on to the next level. For this reason, a strategy based on bringing digital technologies to daily activities is a powerful engine for computer training. The digitization of Government activities, which is studied in detail in this document, helps create such a climate. Once this dynamic achieves a certain momentum, basic computer literacy spreads.

For higher levels of digital experience, the learning mechanisms are more structured. To make them efficient, however, they must be closely tied to the social or work environment. At the user level, computer skills are associated with immediate practice. The most efficient training programmes also have a strong link to practice and to the real needs perceived by the user. In this regard, one possible option is to adapt and revise the "alternating model" of theoretical and practical training. Although this type of training was developed for more complex specializations and professions and combines general and specialized education, the essential element is practice. The application of this model to computer training would emphasize specialization, leaving aside the more general aspects of the technology. All of this can contribute to the creation of suitable approaches to training and educational institutions that do not follow the traditional patterns of schools or any patterns derived from them. This means that leaders (managers, directors, faculty, etc.) must cooperate with efforts to implement training programmes in which teachers are more like tutors than instructors.

Institutions' resources and learning and training initiatives must be utilized to the maximum extent; strategic national and international alliances, with the private sector and with civil society, can help expand the scale of efforts to prepare society for the digital era. Computer training efforts should be concentrated on key users, such as public officials,[88] nurses and teachers,[89] whose close

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[88] High-ranking public officials play an important role, in that they make decisions with a direct influence on the adoption or rejection of ICTs in different areas of civic life. Their lack of awareness and ignorance of ICT's potential can be a decisive barrier to the development of the IS.

[89] In Chile, every school entering the "Enlaces" Programme receives training for 20 teachers over a two-year period at their own school, with annual follow-up in the form of seminars and other activities. The

contact with the community can ensure that the benefits of digital information management will be enjoyed by broad sectors of the population. Despite unequal access to the technology infrastructure, the training of these users provides benefits that are a public good, cutting the prices of services, improving their quality and increasing productivity.

Convergence of standards and experimental use of different *software* models

Evidence shows that public policy has an important role to play in terms of research and promotion of the development of open standards that are consistent with those prevailing at the international level. This can be carried out by using four instruments. First, as stated in the Bávaro Declaration (2f), "Given the importance of technical standards in the development of the information society, the countries of the region shall regularly carry out in-depth economic and technical analyses to make sure that the regional information society is neither locked out of global trends nor locked into particular technological solutions". Second, the promotion of common standards for ICTs implies supporting the work of national entities responsible for developing voluntary norms by consensus in the industry. In some countries, standards committees have been formed, supported by national standard-setting bodies, which established technical groups with the participation of public agencies, large businesses and trade associations. Third, mandatory standards for the public sector can promote specific solutions and technological approaches and attract the private sector. Fourth, the countries of the region should participate actively in international processes for adopting de jure standards. Some international forums and standard-setting bodies in the area of ICTs – such as the European Telecommunications Standards Institute (ETSI),[90] for example, which has overseen the adoption of open standards such as the Global System for Mobile Communications (GSM) or Digital Video Broadcasting (DVB)– are providing incentives for Governments and businesses from Latin America and the Caribbean to participate in their deliberations.

The diversity of existing regulations makes it necessary to seek guidelines for exchange and standardization at the regional and subregional levels. The development of standards to ensure interoperability among different public services, between public and private sectors, and among countries is a top priority. This will make it easier to take advantage of economies of scale and will benefit the population moving between countries. Such standards should have an international frame of reference, for example to facilitate international e-commerce, but they should be adapted, when necessary, to the particular needs of the region.

In addition, various authorities have already begun to explore the possibilities of open source code software and freeware. In the Rio de Janeiro Declaration of November 2004, the ministers and delegation chiefs of Latin America, the Caribbean and the European Union stressed "the importance of the development of open international standards, which in the framework of technological neutrality, would permit equal access to open source, free and proprietary software. In this context, value the efforts to develop projects and practices that use free and open source software. This framework would provide for the promotion and production of technologies and content serving the public interest at all levels, keeping a high degree of interoperability of systems, in order to broaden economies of scale in the public domain, for the benefit, especially, of developing countries".

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approximately 1,000 trainers in the programme are hired by the network of universities maintained by "Links," in close cooperation with local authorities of the Education Ministry. See Hepp and others (2004).

[90] http://www.etsi.org.

Regulatory frameworks for spreading the use of ICTs and favouring collective access

The development of information societies requires public policies to expand acess, strengthen capacities and increase the efficiency and transparency of the State. These policies have very broad regulatory impacts, and one of the greatest challenges is to take into account the particular connectivity needs of Latin America and the Caribbean. The region has made great strides in mobile telephony, but progress in computers and Internet access has been concentrated on the highest-income quintile of the population. If the region tries to recreate the ITC diffusion model prevailing in developed countries, it will face restrictions that will have consequences for equity and growth. At the other extreme, Latin America's challenge is also different from that of sub-Saharan African nations, because its per capita income is several times greater. The result is that the region has its own particular set of problems, with national variations: whereas some countries are in a position to launch policies aimed at accelerating the development of broad-band Internet based on personal computers and a convergent infrastructure based on IP, others must strive to accelerate the penetration rate of cell phones while consolidating a national network of public access centres, concentrating on strategic access points such as educational and municipal facilities.

Given these restrictions, there are four public policy alternatives for access to consider: (i) expansion and reinforcement of mobile telephony, (ii) connectivity through wireless networks, (iii) computer networks with broad-band Internet access through wired networks at public access centres and other access facilities, and (iv) exploration of new alternatives, such as digital television.

To analyse these alternatives, some considerations are important. First, they are partially substitutive and partially complementary to the extent that they allow for a variety of services (voice, data, etc.) through the Internet, although with different characteristics and conditions. Second, there are hybrid ixtures that combine wired and wireless technologies. Third, public policy can bring different options into efficient coexistence, that is, it can create a combination that avoids duplication and wasted resources and permits new "leapfrogging" such as what some countries in the region have achieved in mobile telephony. Fourth, although the third alternative emphasizes community access, individual or collective access options can be present to a greater or lesser degree for each alternative. There have even been instances of collective access to mobile telephony, for example in rural communities or micro-enterprises that rent mobile telephones by the call.

Considering the first alternative, mobile telephony has found a path to development and is expanding rapidly in the region as an individual access option that does not exclude collective forms. The challenge is to ensure sustainability. The pre-payment model should yield sufficient returns for companies to accumulate enough earnings to invest in the expansion and modernization of networks with a view to generation 2.5 and generation 3.[91] The recent mergers seen in this sector show that consolidation has been necessary to raise capital for expanding and renovating mobile networks as services are provided to lower and lower income segments of the population.

In the second alternative, technological advances require a certain convergence of the different networks into a "single infrastructure" with an IP platform in order to provide IP telephony and other services available on the Internet, taking into account that this infrastructure must be capable of supporting advanced services such as video.

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[91] The relationship between the earnings of telecommunications companies and their investment in networks does not always follow a predictable pattern in Latin America and the Caribbean. The command centres of most companies are located outside the region and follow a logic that is not always compatible with regional interests. For example, although mobile telephone companies in the region had solid earnings in 2000 and 2001, the bidding on third-generation licenses in Germany and the United Kingdom –which were valued at billions of dollars– led to a crisis in the regional mobile telephony sector.

Regarding the third alternative, the idea is to empower strategic points to ensure that resources have the greatest possible impact. The role of municipalities and schools is of primary importance in this regard. National networks of public access centres as a means of collective access to ICTs and the services offered on that platform have unleashed a large-scale social phenomenon in the region that represents not only a method of connecting but also new ways of weaving together the social fabric. Beyond the technology they bring, public access facilities can be seen as meeting places and learning centres for the masses.

In the fourth alternative, like the second one, uncertainty about future technology development predominates. Public policy must view access technologies not as givens in the Information Society, but rather as tools that can be deployed in accordance with the particular characteristics of the economic and social environment. From this point of view, the first question is not how to react to the arrival of digital television, but what kind of digital television the region requires to move towards an inclusive IS.

All of these alternatives entail decisions that must be studied and discussed, but the momentum is clearly in the direction of building a new regulatory framework that will support the universalization of ICTs and promote collective access.

Revision of financing tools

The mobilization of different types of financing for the development of information societies requires a joint vision of the role of the public and private sectors, particularly in view of the fact that the current level of ICT spending in the region is not enough for the benefits of the new technologies to reach beyond high income sectors and larger businesses and organizations. The point of departure for implementing a financing policy is to devise digital development strategies that give priority to it and that are effectively coordinated in every country as well as at the regional level.

In addition to setting priorities, the criteria for a financing policy include principles of efficiency, transparency and agreement between the public and private sectors, incorporating civil society and even international cooperation. In particular, the principle of efficiency should not be static but dynamic, aking into account the impacts of technology. In this regard, many of the current financing tools should be revised in light of technological progress to take advantage of the potential of available technologies such as mobile telephony, wireless solutions and value-added services (IP telephony, among others). Since access to ICTs does not depend exclusively on the telecommunications sector and requires investment in hardware, sofware and training, "universal access" funds should be modified to incorporate a broader and more consistent concept of access to ICTs, increasing their reach to other sectors of the industry involved in providing universal access.

In conclusion, advancement towards increasingly information- and knowledge-intensive socieities is not an automatic process that simply grows out of the spread of technology or the development of markets. The characteristics of digital organization –its network structure, its impact on all sectors of the economy, society and the State, and its ability to provide information and knowledge in the form of a public good– require the development of institutions, mechanisms and regulations embedded in coordinated public policies and private actions. For this reason, "It is important to underscore the fact that the information society does not exist within a vacuum, nor is the transition towards the 'digital age' an automatic process. The information society depends heavily on the characteristics of the industrial society that it builds upon. … The digitization process must be supported by institutional developments in a number of interrelated fields, which might otherwise create bottlenecks in the digital organization of an information society" (ECLAC, 2003a). It is necessary, then, to create an appropriate environment to optimize the benefits of the technology infrastructure and the applications and content of digital networks so that inclusive, democratic and competitive information societies can emerge. Regional integration and intra-regional cooperation will play a fundamental role in the search for and implementation of adequate solutions.

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