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1

Costa Rican Advisory Commission on High Technology (CAATEC)

DIGITAL COSTA RICA

Bridging The Digital Divide in Costa Rica

Access to and Use of Information and Communications Technologies (ICTs)

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This document was written by Ricardo Monge, Executive Director of the Costa Rican Advisory Commission on High Technology (CAATEC), and Federico Chacón, Coordinator of the Program "Communcation Without Borders" (CWB). It is part of a more ambitious project called "*Costa Rica e-Readiness*", whose goal is to measure and monitor Costa Rican readiness to make a successful transition to a knowledge-based economy or information society. This effort is sponsored by several international organizations, such as the World Bank (*Info*Dev Program), the Interamerican Development Bank (IADB) the Central American Bank for Economic Integration (CABEI), the United States Agency for International Development (USAID), and the Central American Secretariat for Economic Integration (SIECA, in Spanish), as well as by several Costa Rican and multinational private enterprises established in the country. We have also had logistical support from the California Council on Science and Technology, and the Costa Rican Ministry of Science and Technology.

We hope that the results presented in this document will serve as a basis for defining policies to foster the development of Costa Rica in a world that is every day more globalized and undergoing great technological changes. We also hope that its contents will serve to promote the interest of other countries in these issues, so that they may share their findings with Costa Rica and the world.

The opinions voiced in this document belong exclusively to their authors; they are not necessarily the opinions of the CAATEC Foundation or its sponsors.

"it may reasonably be said
that the incidence of poverty has been stable
since 1994 at levels close to 20% in [Costa Rican] households...
This behavior occurs in parallel with a tenuous but persistent tendency
towards increased income disparity" *(State of the Nation Project, 2001, p. 77)*

"technology is like education
– it allows people to rise out of poverty by themselves .
Thus, technology is a tool for growth and development
and not only a result of it" *(UNDP, 2001, p. 27)*

"The key element to advance towards a Knowledge-Based Society is the creation of opportunities under equal conditions, so that all Costa Ricans may have access to Information and Communications Technologies, especially to the Internet. In this way we hope to overcome the social mobility problems of those people whose growth is lagging, to offer the youth of the poorest homes and of the most remote regions the possibilities of self-improvement that are available for those who are part of households with greater buying power" *(Miguel Angel Rodríguez, President of the Republic)*

"People do not want charity. They want a chance"
(James D. Wolfensohn, President of the World Bank)

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EXECUTIVE SUMMARY

Throughout history, the world has passed through different developmental stages, which have brought about important changes in the organization of society and the way it produces and distributes goods and services. At this very moment the world is undergoing a transition towards a new developmental phase known variously as the Age of Knowledge, the Digital World, or the Information Society. This new age emerges as a result of accelerated processes of technological innovation which have been occurring continuously from the middle of the twentieth century onwards, specifically in the fields of computing and communications. These technological revolutions allow for a greater closeness between human beings, facilitating the digital transmission of data, information, knowledge, images, videos, music, etc. This progress is constantly transforming all the areas of action of human beings: economy, organization, science, and technology, as well as culture, society, and politics. In other words, there is a complete revolution related to *access and use* of *Information and Communications Technologies (ICTs* – revolutions in the use of fixed-line or wireless telephony, computers, television sets and, especially, the *Internet*.

Access to and use of ICTs is shaping the coming knowledge-based society – a society that will be very different from that of the twentieth century. It will involve people who will have different forms of work (part-time, work from the house, etc.), and who will have greater access to information and knowledge from other latititudes, who will be in contact with what is happening in the world, at the level of communities, families, etc. – in other words, a world where people who currently do not have any voice will be able to participate in decisions for the future, thanks to connectivity.

Different levels of access to and use of ICTs, mainly the Internet, constitute a challenge for this new developmental stage: they pose a real threat in the sense that they may increase the gap between the rich and the poor, both between countries and within a given country. This challenge exists because those with greater purchasing power will possibly have quicker access to ICTs and therefore obtain greater benefits from their use, accordingly increasing their productivity and wealth. At the same time, fighting this threat through appropriate policies becomes an extraordinary weapon to increase a nation's socioeconomic development, fighting poverty in an efficient manner. The present work deals with these subjects, particularly with what has been called the *Digital Divide*; it represents the first comprehensive analysis for Costa Rica of access to and use of ICTs by its citizens.

The study's main purpose is to evaluate the magnitude of the Digital Divide in Costa Rica by reference to demographic, economic and social variables. It considers the policies adopted by this country's authorities more than ten years ago to close the Digital Divide (even if this term had not yet been invented); and tries to identify the policies that must be adopted in the short- and medium-term in order to achieve the desired goal: a single Costa Rica with all its citizens connected to the Internet, living in a successful information society.

To achieve the study's objectives we had the support of the National Statistics and Census Institute (INEC), which included in its year 2000 household survey a module on Information and Communications Technologies (ICTs), and which also made an extrapolation of the results to the whole population according to the structure of the last Census available. In addition, UNIMER Research International was contracted to carry out two surveys to study the level of Internet access and use in youths and adults in Costa Rica in the year 2001.

The main findings and policy recommendations of the study are:

A. The existence of a Digital Divide in Costa Rica is evident between geographic zones, as well as between adults and youths, and between groups of individuals with different income and educational levels. This gap is not only related to Internet access, but also to access to other ICTs. It is necessary to make a strong a short- and medium-term effort to close this gap in order to avoid the existance of two Costa Ricas: one with access to ICTs and the other one without it.

B. Internet coverage is very low in Costa Rican households, with only 3.4% of them enjoying this service. However, given this coverage, Internet use is much higher than would be expected; it is estimated that 84% of youths and 23% of adults have used the Internet at least once in their lives. In other words, owing to the existance of electronic literacy programs of the Omar Dengo Foundation and the Ministry of Public Education, which have been carried out for over a decade, and other forms of access to the Internet, such as in the workplace, Internet cafés, schools, colleges and municipalities, access to and use of this tool is much greater in Costa Rica than the figures from the household surveys imply. These findings clearly show that initiatives to promote Internet access and use by all Costa Rican citizens, such as the "Communication Without Borders" project executed jointly by the MICIT and CAATEC, should receive firm support from all the country's sectors.

C. The use of Internet as a tool in daily Costa Rican life is still in its initial stages, especially when we consider that in the country this tool is mainly used for communication with friends and relatives (e-mail), and to a lesser degree for electronic commerce (business-to-consumer [B2C] or business-to business [B2B]), homework or work in the house. This seems to be related to the fact that there are not enough Internet Content Providers (ICP) in Costa Rica, and that the most developed countries are the leaders in this field. In fact, most Internet contents are written in English and are developed by ICPs in developed countries. A policy aimed at creating a bilingual society (Spanish - English) in Costa Rica would help a great deal in this area, as would the participation of private and public institutions and authorities to create Internet contents that are relevant to Costa Ricans.

D. No evidence was found of intensive Internet use in the workplace by heads of households in Costa Rica. This might be associated with a lack of a digital culture in local businesses, a subject that CAATEC is now

analyzing in another study. Nevertheless it is worth noting that this preliminary result implies a serious challenge for the Costa Rican business sector, which must carry out programs to bring about a cultural change aimed at introducing new ICT-facilitated work methods to support a successful transition of Costa Rica to an information society or an knowledge-based economy.

E. Even though an important Digital Divide has been identified in Costa Rica, the country's environment is favorable to improved access to and use of ICTs by its citizens, especially use of and access to the Internet. In the first place the country has a high rate of digital literacy. In the second place, the importance placed on the High Technology sector (local and multinational enterprises), including the software industry and its future expansion, provides a considerable source of training and motivation that will lead many Costa Ricans to want to have Internet access from their homes. Lastly, having a Ministry of Science and Technology that governs everything concerning access to and use of ICTs in the country, facilitates design and implementation of projects and programs that really combat the Digital Divide.

F. One of the projects designed jointly by the MICIT and ICE (the Costa Rican Electrical Institute) is the Advanced Internet project, which would allow Costa Rica to make a qualitative and quantitative leap in the short term (one year), by making it possible to provide more than one hundred thousand people with high-speed fiber optic connectivity to the Internet, making use of Digital Subscriber Line (DSL) technology. This would have profound effects: if, for instance, centralization is no any longer necessary for decision-making in many activities, workers could avoid having to commute every day for work. Remote work methods would solve some serious problems that Costa Rica faces, mainly in urban areas of high population concentration, such as traffic congestion, environmental pollution, waste of productive time in commuting to work, stress on active citizens, citizen security, and so forth. The Advanced Internet project must therefore be considered a priority by current and future governmental authorities to the benefit of all Costa Ricans. Excuses that hinder the success of this initiative should not be accepted.

G. Existance of a continuing education system is crucial for achieving success in the information society. To this end, universities and other educational centers must make great efforts to design programs accessible to all Costa Rican professionals from their own homes and offices, without having to commute to campuses. The Internet allows for a great variety of remote educational methods. In this way, knowledge-society workers will be able to stay up to date from their own offices, homes, or any other place from which they can connect themselves to the Internet (Internet cafés, municipalities, libraries, telecenters, etc.).

H. Two obstacles have been identified to increasing the possibility of Internet access in Costa Rican households: one is the cost of telephone service,

which is very expensive according to opinions of those interviewed in surveys conducted for this study, and to the comparison with other countries for the same type of service. In contrast, Internet access cost seems to be competitive with those of other countries. The second obstacle is the low incidence of Internet access via cable modem compared to other countries such as those of Europe. This could be due to the lack of enough Internet Service Providers (ISPs) inasmuch as interconnection costs paid by cable enterprises to ISPs should be very competitive, making it more interesting for them to offer Internet access to their clients. The "Right to Internet Access Law" project (File No. 14.029) constitutes an important effort in this direction.

I. While demonstrating the magnitude of the Digital Divide in Costa Rica and commenting on policies adopted to fight it is important, creating a follow-up mechanism to measure achievement of the policies' objectives is crucial to success in meeting this social challenge. Accordingly, we recommend that, as is done in other countries, the National Statistics and Census Institute (INEC) include in the yearly Household Survey the module of questions that made possible the present study, in order to obtain the information on ICT access and use in Costa Rica that is necessary to evaluate its evolution through time.

J. In order to increase people's confidence in the use of the Internet as a tool to carry out financial, commercial and other transactions, it is necessary to create a Technical Department which would study and make suggestions on policies for an effective fight against elements that discourage Internet use by citizens, specifically including viruses, hacker intrusion, author's rights on the network, and electronic fraud. Such a Department must be made up of representatives of the public, private, and academin sectors, and should be duly recognized by Costa Ricans as a neutral, apolitical and technical entity.

K. The sharing of experiences between Costa Rica and other countries relating to the fight against the Digital Divide will allow them to share the positive aspects of national policies, and simultaneously to obtain information on new ways to face this challenge. With this in mind, governments, private and academic sectors, and international organizations must encourage all types of mechanisms to share information about these efforts throughout the world. This would facilitate knowledge transmission in an area vital to the progress of nations. An effort to maintain programs such as the World Bank's *Info*Dev and other similar programs should be pursued.

L. Perhaps the most important conclusion of this study is that Costa Ricans are at a crossroads: we can choose between leaping towards a successful knowledge-based economy with marginal effort and cost, or accepting being a poor twenty-first century society. The good news is that we have many tools to achieve the first objective; whether we achieve it or not will depend on ourselves.

1. Introduction

Throughout history, the world has passed through different developmental stages, which have brought about important changes in the organization of society and the way it produces and distributes goods and services. Alvin Toffler (1970), in his famous book "*Future Shock*", divides the development of humanity into three stages. The first is the *Agricultural Age*, in which human beings obtain better yields from farming than from hunting and collecting wild products. In general, this stage of evolution is characterized by exploitation of cultivable lands and the application of rudimentary techniques to obtain higher amounts of agricultural products. During this phase, the economy was characterized by the use of two productive factors: *Land and Labor*.

The second stage, the *Industrial Age*, was characterized by the emergence of a new productive factor: *capital*, which, along with land and labor, allowed human beings to increase productivity and satisfy more needs. This phase is related to the Industrial Revolution: the invention of the steam machine and electricity, among other technologies. Thus, the emergence of a new productive factor beyond *Land* and *Labor* created an environment which gave rise to more economic and social transformations during the nineteenth and twentieth centuries.

According to Toffler, the third, present stage of development of humanity is the *Age of Knowledge*. This developmental stage is characterized by the addition of a new productive factor to the previous industrial scheme. This new factor is *Knowledge*, which emerges as a result of accelerated processes of technological innovation that have been occurring continuously since the beginning of the second part of the twentieth century, specifically in the fields of computing and communications. Thus, the information society results from technological revolutions that make possible a greater closeness between human beings, by facilitating the digital transmission of data, information, knowledge, images, videos, music, and so forth. This progress is constantly transforming the areas of finance, organization, science, and technology, as well as culture, society, and politics. In other words, there is a complete revolution related to access to and use of Information and Communications Technologies (ICTs).[1]

The revolution associated with access to and use of ICTs is shaping the coming knowledge-based society, a society that will be very different from that of the twentieth century, and from what most people currently expect it to be. It will be based on tendencies such as a rapid growth of the adult population, and a decrease in the young population (increased longevity), increases in migration, and an emergence of different forms of work that will be facilitated by ICTs. Some interesting features of these new types of work include the possiblility of not being a full-time employee, and of working from home.

[1] *ICTs are the media and instruments that we use to make possible the digital transmission of voice, data, videos and images, by means of telephones (mobile and fixed), facsimile, computers and television, some of which provide the foundations for another ICT: the Internet.*

In the coming knowledge-based society, the key labor force will consist of "knowledge workers" and "knowledge technicians": professionals with a great deal of knowledge obtained through formal education, who must keep themselves continually up to date. For this reason, one of the critical differences between this new social order and that of the past will be that education does not end when a professional starts to work, but lasts a life-time, making continuous education critical in the information society.

The terms "knowledge industry", "knowledge work" and "knowledge workers" are very recent and therefore their implications for human behaviour and values, on personnel management, and on how to make all this knowledge generate positive results in the solution of political and economic problems are not fully understood. Something that is completely clear is that the emerging knowledge- or information-based society will be radically different from the society and economy at the end of the twentieth century.[2]

It is evident that this new context presents important challenges for any country, as well as opportunities. Accordingly, the Human Development Report of the United Nations Development Program (UNDP, 2001) indicates that at the present, developing countries have two powerful tools to advance themselves: Globalization and Information Communications and Technologies (ICTs). In fact, it has been said that

> *technology is like education – it allows people to rise out of poverty by themselves – . Thus, technology is a tool for growth and development and not only a result of it"(p. 27)*

Furthermore, Mr. Kim Dae-jung, President of the Republic of Korea, has recently emphasized that:

> "*During the twentieth century tangible elements, such as capital, labor and human resources were the powers that boosted economic development. But in the new century, intangible elements such as information and creativity will give nations a new competitive advantage. Consequently, if we are able to develop the potential of our citizens by fostering a spirit of creative adventure, individuals as well as nations will become rich, even if they do not have much capital, manpower or natural resources*".[3]

In light of this reality, it is imperative that countries, especially developing countries, redouble their efforts and prepare to successfully face the challenges, and profit from the opportunities offered to them by the Knowledge-Based Economy or Information Society. This work is not easy, as has been indicated in some recent studies,

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[2] *For a detailed description of these challenges in the particular case of Costa Rica, see "Telecommunications: a key for Development" , Alvin Toffler Institute (2000 p. 8-24).*

[3] *United Nations Development Program, UNDP, (2001). Human Development Report 2001. Pg. 24. http://www.undp.org/hdr2001/*

> "*... e-readiness measures a nation's capacity to participate in the digital economy. e-readiness is the source of economic growth in the century of interconnection, and is a precondition for carrying out electronic business successfully. Neither countries nor enterprises can prosper if the basic pillars of electronic areas are not in place.*"[4]

Therefore, a society's *e-readiness* is the degree of development that the society has achieved to be able to take advantage of opportunities, as well as to face the challenges brought about by a Knowledge-Based Economy; that is to say,

> *"... the degree to which a community is able to participate in the Interconnected World. [Which] is measured according to relative progress in the most critical areas for adopting ICTs and their most important applications."*[5] Among them, telecommunications and Internet infrastructure, human resources development, legal framework, e-readiness of public institutions, and development of a financial system in accordance with businesses' needs with regards to technological innovation.

Along with this great challenge, there is another one equally important and complementary; it refers to the fact that the ICT revolution – and as a result, access to them and use of them – constitutes a real threat in the sense that they may increase the gap between poor people and rich people, both between countries and within a given country. This fear for an increasing gap between countries is reasonable because ICTs are going to be the main motor for growth during the next two decades, and developing countries have far less computers and Internet connections than rich countries (The Economist, 2000). This could possibly produce an increased disparity between the incomes of both groups of countries,depending on the success of developing countries in preparing themselves for a Knowledge-Based Economy. For these reasons it is important to study this subject, define policies, and monitor progress in each country.[6] With respect to the possibility of an increased division between the poor and the rich within a given country, there is a challenge because those individuals with more purchasing power can have better access to ICTs, as a result obtaining greater benefits from their use, and increasing their wealth disporportionately.

Even though both sides of the possibility of a gap increase between the rich and the poor are important, the present document deals only with the concept of a gap that

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[4] *Mc Connell international (2000). Risk E-Business: Seizing the Opportunity of Global E-Readiness. Pg. 2. http://www.mcconnellinternational.com/ereadiness/default.cfm*

[5] *Harvard UniversityCenter for International Development (CID), (2000). Readiness for the Networked World: A Guide for Developing Countries. Pg. 6. http://www.readinessguide.org/*

[6] *In the case of Costa Rica, the "Costa Rica e-Readiness" project addresses the subject, which is carried out by a group of experts from CAATEC (the Costa Rica High Technology Advisory Committee), with support from the Ministry of Science and Technology, the California Council on Science and Technology, private businesses, and international organizations.*

acess and use of ICTs may generate between the rich and the poor people within a country: *Costa Rica*.[7]

This document is divided into five sections, including the introduction. The concept of a Digital Divide is analyzed in the second section; the third section contains a diagnosis of the situation in the particular case of Costa Rica, the fourth section is a presentation and discussion of the main policies that have been implemented by authorities of this country to confront the challenge, while the last presents the main findings of the study.

2. The Concept of a Digital Divide

The concept of a Digital Divide is a recent one. It refers to the differences associated with access to and use of applications of information and communications technologies (ICTs) among individuals of a given country, or between different countries or regions. As has been pointed out before, this work focuses on the different degree of access to and use of ICTs applications among individuals of a given country, and especifically, on the *Digital Divide among Costa Ricans*. In other words, this is a study of who has access to ICTs in Costa Rica, who uses ICTs in Costa Rica, what the chances are for most Costa Ricans to acess and use properly ICTs, policies may be adopted to reduce the Digital Divide in this country, and what implications these policies have.

One of the best descriptions of the Digital Divide was given by officers from the United States Department of Commerce, who stated

> *[while] some people have the most powerful computers, the best telephone service and the fastest Internet service, as well access to rich content and appropriate training ... another group of people ... does not have access to the most modern and best computers, to the most reliable telephone service, nor to the fastest and most convenient Internet service. The difference between these two groups constitutes ... the Digital Divide.*

Even if the previous paragraph gives the impression that the concept of a Digital Divide is simple, its study and measurement are not, because it includes a variety of dimensions, all of them related to the different degrees of access to and use of ICTs that people have. In fact, the concept of a Digital Divide is closely related to income, gender, educational level, place of residence, age, language, physical disabilities and other socioeconomic dimensions. However, there is a group of general concepts related to this

[7] *In spite of the fact that the dimension of the digital divide between businesses of different sizes or productive sectors may be included in an analysis such as this one, to do so would be to go beyond the aims of this study. However, the Costa Rica High Technology Advisory Committee (CAATEC), with support from the Central American Secretariat for Economic Integration (SIECA) and the United States Agency for International Development (USAID), is carrying out a study of access to and use of ICTs by Micro, Small and Medium Costa Rican businesses (SMEs), whose results will be available by the end of the first semester of the year 2002.*

subject which facilitate its description and the discussion on how to confront the challenge of the Digital Divide (Noll, *et al*., 2000).

The first concept deals with the different access that people have to computing equipment or hardware. Why is this important? Several years after telephone service was invented, it was considered vital for enabling people to actively participate in the modern world, and therefore every household had to have a telephone. This challenge or goal was known as providing "*universal service*". With the introduction of the Internet, a question rises of whether the concept of "*universal service*" must include household access to specific information in such way that household members may actually join the information society or the knowledge-based economy. Clearly, this new dimension of universal service involves not only the provision of a telephone for each household, but also a computer that is connected to a public telecommunications network which must be adjusted to people's needs and special requirements (language, physical challenges, etc.). A discussion on household access to ICTs with results stratified by socioeconomic and demographic variables is presented in subsection (a) of section 3, to evaluate these kinds of challenges in the particular case of Costa Rica. Furthermore, in subsection (b) of the same section we explore access to the Internet through some means other than home computers, such as Internet cafés and schools.

The goal of household access to a computer connected to a public telecommunications network is to facilitate access to computer programs (software), information, entertainment, etc. Yet, unlike telephone service, where the device's basic features and service quality (voice transmission) are the same for all users, in the case of the Internet this will depend on the hardware's intrinsic characteristics, and the public network to which each household is connected. This issue is not well known yet in developed countries, and for this reason, specifically for Costa Rica, the second part of section 3 discusses the different types of access Costa Ricans have to the national telecommunications network, as well as the impact that a successful implementation of the "Advanced Internet" project may have. This project has been carried out jointly by the Costa Rican Ministry of Science and Technology (MICIT), and the Costa Rican Electrical Institute (ICE).[8]

Another concept in analyzing the Digital Divide is that of "*equal access*", which refers to policies that facilitate consumer access to the Internet through multiple Internet Service Providers (ISPs). It is related to issues on Internet regulation, because lack of competition between different ISPs allows for higher prices of Internet services, little variety, and low quality of service. The issue of quality of service has several aspects, the most important of which are client administrative service and prevention and failure service. The two of them are not necessarily related, but they usually improve simultaneously in a multiprovider environment (i.e. one with several ISPs). In short, the

[8] *For an in-depth description of this project, see "Establecimiento de la Red de Internet Avanzada y Creación de la Red Nacional de Investigación Avanzada", in* Seminario Costa Rica en el Mundo Digital: Final Document*. CAATEC Foundation, San José: Costa Rica, November, 2001 (pp. 15-23). A digital version of this document may be obtained from the CAATEC Web page (www.caatec.org).*

issue of equal access has to do with how friendly the Internet is for Costa Ricans, which is discussed in subsection (c) of section 3.

When reading this document, it must be borne in mind that the study on the Digital Divide not only includes the concept of *level of access* to ICTs, but also people's *intelligent use* of this new tool for development. This will depend on Internet contents, because not too much can be achieved if Costa Ricans have access to the Internet through multiple means of connectivity, but there are no national or foreign Content Providers who will furnish added-value information for users, or increase businesses competitiveness. For this reason Jeffrey D. Sachs emphasizes the fact that the great division between rich and poor countries – widely known with respect to aspects of society and wealth – prevails and it is equally disturbing in the sphere of ICTs (CID, 2000). It is also disturbing because the most interesting contents for Internet users have been created in the most developed countries, and they are mostly written in English. For this reason, we present a first analysis of Internet use by Costa Ricans in the last subsection of section 3; it does not pretend to cover the entire area of the importance of network contents; without any doubt, this issue requires a separate study.

Acknowledging that a reduction of the Digital Divide constitutes an important challenge for the well-being of any country, Costa Rican authorities have decided to confront that challenge by means of an innovative program called "Communication without Borders", which complements other efforts in the same direction. All of these issues are discussed in section 4 of this document. Furthermore, even though there are specific reasons to justify a society's efforts to reduce the Digital Divide, it is important to evaluate the mechanisms used to achieve such an objective from an economic perspective. In consequence, section 4 of this document concludes with a short discussion on the policies that Costa Rican authorities have implemented to reduce the Digital Divide, because there is always a chance that while pursuing a specific objective using specific tools, there might be unnecessary social costs or the possibility that the desired result is not been achieved (Sen, 1997).

3. The Digital Divide in Costa Rica

As mentioned before, the present section has been divided into four sub-sections, in order to evaluate the Digital Divide in Costa Rica. In the first, there is a discussion on the issue of *universal service*; in the second the isuue of *equal access* is analyzed; in the third the issue of *capacity to pay* for having access to the Internet is presented, and the issue of *content* is discussed in the fourth subsection. The analysis on *policies* implemented by Costa Rican authorities for reducing the Digital Divide, and the pending agenda are discussed in the fourth and fifth sections of this document, respectively.

a) Universal Service

In Costa Rica, the Costa Rican Electrical Institute (ICE) has estimated that 65,000 households have access to the Internet, out of which 60,.000 are connected over a telephone line, and 5.000 over cable TV media. This means that 7.7% of households

throughout the country have access to the Internet.[9] To evaluate the degree of confidence we can have in this estimation, as well as the importance of the challenge of the Digital Divide for Costa Rica, a module of questions on Costa Rican household access to ICTs was included in the Household Survey carried out in June, 2000. [10]

Table No. 1 Costa Rica: Household Access to ICTs, by rural and urban area, year 2000
- figures in percentages -

	Total Country	Zone	
		Urban	Rural
TOTAL OF HOUSEHOLDS	837,060	47.7%	52.3%
FIXED LINE TELEPHONY	54.3%	73.6%	36.8%
CELLULAR TELEPHONY	11.2%	18.0%	5.0%
FAX	4.6%	7.2%	2.2%
COMPUTER	12.2%	19.2%	5.9%
INTERNET ACCESS	3.4%	5.9%	1.1%
COLOR TELEVISION	84.1%	91.6%	77.2%
CABLE TELEVISION	12.5%	22.1%	3.8%

Source: CAATEC, based on figures from the Household Survey.

As can be seen in this table, Costa Rica has a relatively dense telephone coverage, with more than half of the households having at least one fixed-line telephone[11]. Furthermore, this level of coverage could actually be even higher when one takes into account the use of cellular telephones (more than 300.000 subscribers), especially in urban areas. However, it is worth noting that in the face of a knowledge-based economy, coverage with respect to access to computers or the Internet by household is very low in this country. In fact, only slightly over 12% of Costa Rican households have a computer and only one-fourth of these households have access to the Internet (3.4%). This contrasts strongly with figures of developed countries such as the United States and countries of the European Union. In the United States there is a computer in 51% of households and 41.5% of them have access to the Internet (U.S. Deparment of Commerce, 2001), while in countries of the European Union, on average, 34.2% of the households have a computer, and 15.4% have access to the Internet (Gizardata, October, 2000, No. 2, p.4).

[9] *It is also estimated that the number of Internet users in Costa Rica is 150.000 people, which implies 4% of the population is online.*
[10] *The survey was made with a representative sample of households (approximately 15.000), but making use of the year 2000 National Census, the National Statistics and Census Institute projected the household survey results to the whole population. This makes it possible to obtain estimated figures for the totality of the Costa Rican households with access to ICTs.*
[11] *In fact, in this group, 92% of households have only one telephone line.*

These data bring show the Digital Divide between developed and developing countries such as Costa Rica.[12]

Estimates from ICE indicate that 7.7% of Costa Rican households have access to the Internet. This figure is greater than the one shown in Table 1, where according to results of the Household Survey of the year 2000, extrapolated to the whole population in accordance with the population structure of the Population Census, only 3.4% of the households have an Internet connection (approximately 28,766 households).

Currently, owing to new advances in ICTs, there are other means to access the Internet, such as the coaxial cables provided by cable TV companies. These media seem to be a potential source for increasing household Internet coverage in Costa Rica, because while only 3.4% of the housekols have access to the Internet, 12.5% have access to cable TV. Furthermore, there have been important investigations carried out for serveral years in developed countries to study the possibility of using electrical lines as a means of access the Internet. In this country, the Costa Rican Electrical Institute (ICE) is experimenting with these new technologies, which, if successful, would make it possible to have a meaningful source for increasing household Internet coverage in the country, where almost all households (96.4%) have electricity, and 84% of them have color television, with a small difference between the urban area (91%), and the rural area (77%).

Another technological alternative that is currently being used as a pilot plan in Costa Rica is Digital Subscriber Line (DSL) technology, which makes use of existing telephone lines for data transmission, but only in areas that are close to (wthin 10 kilometers of) telephone switchboards. The *Advanced Internet*, discussed in detail in section 4 of this document, is a project that is using this technology.

Regardless of the possiblities of a future increase in Internet coverage, the current reality is that there is an important Digital Divide within Costa Rica, inasmuch as telephone coverage is not balanced between urban and rural zones. In fact, while in urban areas more than two-thirds of households have at least one fixed-line telephone, in rural areas only one-third have access to this service. This situation repeats itself in all the other services included in Table 1.

The Digital Divide in Costa Rica looks more serious if we divide the country into six large regions: the more developed Central Valley, and the Chorotega, Brunca, Central Pacific, Huetar Atlantic and Huetar North (Table 2) regions. In fact, the results of Table 1 are magnified when we compare access to ICTs in the Central Valley with that in the rest of the country. While in the Central Valley 5% of households have Internet, in the rest of the regions less than 5% of the households have access to this service – a result strongly associated with differences in access to telephone services between the Central Valley and other regions of the country. While in the Central Valley 66.5% of households have a

[12] *It is worth noting that the opportunity cost of buying a computer with access to the Internet is greater for a Costa Rican household than for a household in a developed country, like the United States. For this reason, the policies to fight the digital divide do not have to be necessarily the same in both countries.*

fixed-line telephone, in other regions this coverage ranges between 28% in the Brunca region, and 49.6% in the Central Pacific region. This information must be taken into consideration when designing any strategy to reduce the Digital Divide in the country.

Table No. 2 Costa Rica: Household access to ICTs, by regions, year 2000
- figures in percentages -

	TOTAL COUNTRY	CENTRAL VALLEY	CHOROTEGA	CENTRAL PACIFIC	BRUNCA	HUETAR ATLANTIC	HUETAR NORTH
TOTAL DE VIVIENDAS	837,060	63.0%	7.3%	5.2%	1.0%	10%	5%
FIXED LINE TELEPHONY	54.3%	66.5%	33.5%	49.6%	28%	29%	38%
CELLULAR TELEPHONY	11.2%	14.9%	4.0%	5.1%	4%	5%	8%
FAX	4.6%	6.2%	2.3%	2.7%	1%	1%	3%
COMPUTER	12.2%	16.7%	5.1%	3.9%	4%	4%	6%
INTERNET ACCESS	3.4%	5.0%	0.7%	0.9%	1%	0%	1%
COLOR TELEVISION	84.1%	89.3%	70.9%	81.6%	75%	74%	77%
CABLE TELEVISION	12.5%	15.2%	10.5%	11.9%	9%	4%	7%

Source: CAATEC, based on figures from the Household Survey.

The Digital Divide, in the particular case of Costa Rica, is important inasmuch as having household access to computers and the Internet will allow its members much more than just working from their homes, or looking for information in the Internet:

> '*The networked world will allow individuals to live and work wherever they choose. There will be mobility without moving*". (CSPP, 2001, executive summary)[13]

As a matter of fact, according to predictions about the ICT industry, within a short time more than 50% of the devices connected to the Internet will not be PCs, but rather intelligent devices and everyday appliances, which would permit different uses of the Internet by members of the same family.[14] Thus, for instance, as discussed in the CSPP study (2001), in households connected to the Internet, owners will be able to monitor their houses from remote locations using various devices or safety mechanisms connected to the Internet. Care of children and the elderly will be easier to do by monitoring houses or care centers from remote places, such as the office. In short, as can be deduced from the latest survey on ICT progress in The Economist (2001), we are only seen the tip of the iceberg in the field of potential uses of the Internet in households. Actually, we live in a society whose private or public institutions (schools, governments, work centers) are being transformed by the ICT revolution as part of a transition towards a knowledge-based economy or an information society. To not fight the Digital Divide means to accept that only one small part of the population enjoys the benefits of the digital age, and to

[13] *Computer System Policy Project (CSPP).*
[14] *According to predictions by the International Data Group quoted in The Economist (2001).*

condemn the majority of Costa Ricans to low living standards. It would mean to accept the existance of two Costa Ricas: one with citizens who have access to ICTs, and another one with citizens who do not. Such a situation has an inherent risk because it might generate social tensions that are threaten the country's social and political stability.

Table No. 3
Costa Rica: Household Access to ICTs,
by income level of household head, year 2000
- figures in percentages -

	Telephone and Computer	Internet	Cable TV
TOTAL HOUSEHOLDS	11.4%	3.4%	12.5%
First quintile	2.2%	1.9%	4.0%
Second quintile	3.8%	1.4%	4.8%
Third quintile	7.4%	3.5%	9.8%
Fourth quintile	20.5%	14.7%	16.5%
Fifth quintile	50.6%	58.5%	47.9%
Don't know / No response	15.5%	19.9%	17.0%

Source: CAATEC, based on figures from the Household Survey

In analyzing who has access to ICTs in Costa Rica with respect to income level, Table 3 shows that in the case of households with access to a fixed-line telephone and a computer, or to the Internet, a little less than three-quarters correspond to households whose head is situated in the two highest quintiles in the country's income range. In fact, the ratio of access to the Internet between the highest-income group and the the lowest-income group is 30:1, a ratio that remains almost the same when comparing the penultimate and antepenultimate income quintiles to the first quintile. In fact there is an important disparity between the two groups with the highest income levels shown in Table 3 (i.e. a ratio of 4:1). Based on this, it is reasonable to fear the possibility of an increased gap between rich and poor people in Costa Rica if the challenge of the Digital Divide is not eliminated, because, in effect, those with the greatest purchasing power will have access to ICTs and will be able to increase their wealth far more than those with less purchasing power.[15] Similar proportions are found when posession of cable TV access is analyzed.

From the perspective of the educational level of heads of households, access of Costa Rican households to ICTs shows an important concentration in households whose heads have the highest educational levels (Table 4). In fact, in the particular case of the

[15] *Furthermore, it is worth noting that according to the Household Survey mentioned, households with 4 members or less have the most access to ICTs in Costa Rica (70%). This gives us legitimate cause for more concern about an increasing gap between the rich and the poor of this country, if the digital divide is not effectively combatted.*

Internet, more than three-fourths of the households with access to this important tool have heads with University educations. A similar situation occurs in the case of households with fixed-line telephone and computers, as well as in those with access to cable TV. This result should not seem strange because the most educated heads of households are those with greater possibilities to become familiar with computers and the Internet, be it at work or when they were students at centers for higher education. Therefore, it is reasonable to say that *"Education and the Internet are the greatest equalizers"*. (John Chambers, CEO Cisco Systems).

Table No. 4.
Costa Rica: Household Access to ICTs,
by educational level of household head, year 2000
- figures in percentages -

Educational level	Telephone and Computer	Internet	Cable TV
Total Households	11.4%	3.4%	12.5%
None	0.5%	0.0%	1.0%
Primary	16.4%	5.9%	22.0%
Secondary	27.0%	15.5%	33.5%
University	54.9%	76.0%	41.9%

Source: CAATEC, based on figures from the Household Survey, 2000.

Several studies, especially in developed countries, have found a clear characteristic of the Digital Divide: a direct relationship between income level and education on the one hand, and access to ICTs on the other, particularly, in the case of the Internet (USDC, 2001). In Costa Rica, both factors have a positive relationship with access to ICTs, especially to the Internet, even if not of the same magnitude. In fact, while the rate of access to the Internet is thirty times greater in households with higher incomes, with respect to households with lower incomes (30:1), with respect to education this gap decreases considerably, to 13:1. In short, these results seem to show that both variables (income and education) are positively correlated with Internet access.

In an analysis of the joint relationships of education and income with Internet access, as shown in Figure 1, it is interesting to note that in Costa Rica, as in developed countries, the greater the income level, the greater the access to Internet at all levels of education except university (USDC, 2001)[16]. The fact that values for Internet access are not significantly different with respect to income level within the category of heads of

[16] *We should mention that 19.9% of households whose members claimed to have access to the Internet from their homes did not provide information concerning their income level; this made it difficult to project figures from the Household Survey to the whole population in this respect. For this reason, results shown in Figure 1 must be viewed with caution. It is necessary to further study heads of households with a university degree in order to understand why there is not a great difference in access to Internet among this segment of the population, independent of income.*

household with a university degree, might be associated with two facts: first, that Costa Rica has had a free-tax policy on imports of computers and complementary equipment for over 15 years, and has thus facilitated access to ICTs by social groups with lower purchasing power; second, that this country was the first to introduce the Internet in Latin America, starting in universities (Monge, 2000, p. 286). This might have had an effect on the way university professionals see the cost/benefit relationship of having Internet access from their homes compared to the rest of the population, because people with a university background appreciate more the positive impact of this tool on their efficiency at work.

As Hilbert (2001) points out, when making policies to help reduce the Digital Divide in a given country, it is important to study separately the independent effects of income and educational level on access to and use of the Internet. While technological revolutions have made room for significant reductions in ICT production costs, facilitating greater access to these technologies by population segments with lower income, in the case of education the story is more complex. Here, technological literacy and critical thinking skills will be the two key features in education at all levels in a knowledge-based economy. In this context, critical factors will include taking technology to classrooms, providing training so that teachers develop the required skills, creating network systems that allow parents to connect with schools and monitor their children's activities and progress, and designing systems that allow adults to learn and develop their capacities, according to their professional needs (CSPP, 2001).[17]

Taking this into account, it is clear that the Digital Divide must be considered as having to do more with the existance and increase of an *educational divide*: those with access to high-quality education, and those whithout it. In short, even if greater Internet coverage (access) is a desirable and important policy goal for Costa Rican authorities to fight the Digital Divide, it must be borne in mind that the most complicated issue concerns human resource skills in the country. On this issue, it is worth noting that Costa Rica is in a privileged situation because of its population's high level of ICT literacy, particularly with respect to computers and the Internet. This is due to the efforts of the Omar Dengo Foundation and the Ministry of Public Education since 1988. Among other achievements, they have implemented the *Informática Educativa (Educational Computing)* Program, aimed at elementary school boys and girls; and the I*nformática para las Comunidades (Computing for Communities)* Program, aimed at the adult population.

The Educational Computing (PIE) started in 1988, aimed at improving the quality of the Costa Rican educational system by means of access to and use of ICTs. In general, the educational centers involved reached boys and girls from priority, socially vulnerable zones, as well as those from rural areas. This involved 434 pubic schools, and 72 that have only one teacher. The PIE covered 225,113 students in the year 2000, and more than

[17] *One of the most significant elements of the Costa Rica e-Readiness project (executed by CAATEC) is the study of the development of human resources in the country, undertaken to better understand the HR requirements of a local knowledge-based economy. Results of this effort will be available during the first half of the year 2002.*

one million two hundred thousand students have been reached since its inception. (See Annex 1).

The Computing for Communities program, currently known as the Computing for All Program, was created in 1989 and has become crucial for the early universalization of pre-Internet digital culture in rural communities and marginal urban communities of the country, including early use of e-mail. We must remember that Internet universalization worldwide, and the ICTs boom, only started in 1995, with the explosion of Internet networking.

Both projects used computers installed in schools in order to reach communities, and represent a major historic step towards closing the Digital Divide between urban and rural areas, as well as between generations (children, youths, adults and the elderly), professionals (enterpreneurs, educators and farmers), and groups of different income levels (students from marginal urban families, and from poor rural areas, compared to private-school students).[18]

It is possible that without such policies there would currently be a much lower level of Internet access in Costa Rica, and a greater Digital Divide.[19]

Everything seems to indicate that Costa Rica continues, as it has done in the past, to work hard to improve its people's skills, ensuring its citizens better opportunities to participate in the digital economy and obtain the best benefits possible for the majority of its population. In fact, the Legislative Assembly of Costa Rica declared recently (2002), through Law 8207, the *Public Usefulness* of the Educational Computing Program (PIE, in Spanish).

The information or knowledge society into which we are entering, and of which we are now only seeing the tip of the iceberg that is about to emerge, will be highly competitive. The effects of this increased competitiveness can already be noticed in Costa Rica: universities are full of graduated professionals who must further specialize to be able to get a job. Therefore, continuing education programs, where universities and technical colleges will have to make greater efforts to design programs accessible by those professionals who are already trained and must stay up to date (whithout having to go to the university campus), become more important. ICTs make available a great range of remote educational methods that can be accessed from any computer connected to the Internet, located at any place in the national territory where such connection exists. In this way, "knowledge workers" will be able to keep themselves up-to-date from their offices, homes, or any other place where they may have access to the Internet (Internet cafés, Municipalities, Libraries, Telecenters, etc.).

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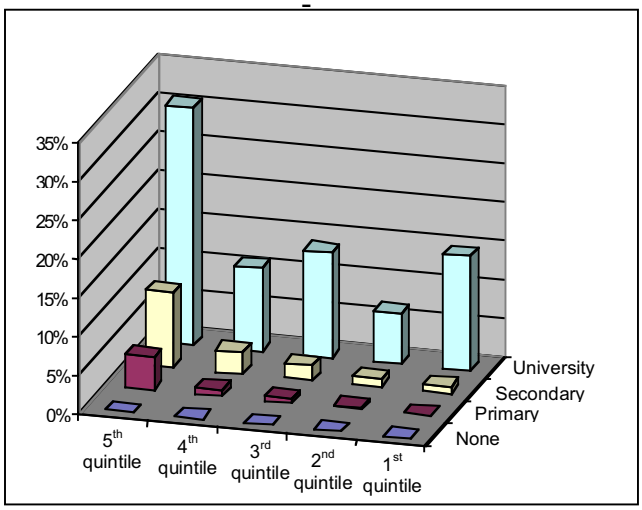
[18] *An evaluation of these programs carried out by the Interamerican Development Bank during the mid-90's showed that 79% of school children covered by the PIE came from families ranging between " low" and " low, socially excluded" income.*

[19] *This assumption is supported by the results shown in the section on access and use of Internet by young Costa Ricans, later on in this document.*

Figure No. 1 Costa Rica: Household Access to Internet, by education level and income of head of household, year 2000
- figures in percentages –



Since Costa Rica has one of the highest literacy rates in the world (100% elementary and junior education, and 76.4% high-school education)[20], the level of education does not seem to constitute an important barrier to reduce the Digital Divide in the country.[21]

It is important to emphasize that technology facilitates use of many skills that should be developed by an educational system in a country's students and professionals. In other words, human resources skills development must be ensured not just for ICTs *per se* (the creation of ICT technicians), but also so that people will be more efficient and effective when using ICTs in other areas that make use of, but are not dediciated explicitly to, this kind of technology. Costa Rican authorities have been working in this area since 1988, before the term Digital Divide had even been invented.

On the other hand, related to the discussion of the previous paragraph, it is important to explore Internet use in schools and other access centers such as Internet cafés – mechanisms that actually increase Internet coverage in the country, and constitute valuable tools to reduce the Digital Divide in any society. It is for this reason that the *Communication Without Borders* program (discussed in section 4 of this document) is so important.[22] In addition, it is necessary to carry out an in-depth analysis of factors that

[20] *Figures according to the table of Social Statistics from the Seventh State of the Nation Report in* Sustainable Human Development *(State of the Nation Project, 2001)*

[21] *For more details on the excellent work on e-readiness of boys, girls and adults in Costa Rica, see CEPAL (1990), Fonseca (1991), BID/FOD (1995), FOD (2001), and the Omar Dengo Foundation Web page (www.fod.ac.cr)*

[22] *Communication Without Borders is a program whose goal is to consolidate a national culture for the use of Internet and e-mail for communication and socially-related issues – a joint effort of the government and*

have an effect on the cost of access to ICTs in Costa Rica, especially Internet access, in order to identify possible areas where authorities can take action. Both issues will be discussed latter on in this section.

Table No. 5 Costa Rica: Household access to ICTs,
By occupational group of head of household, year 2000
-figures in percentages-

Occupational Category of Head of Family	Fixed-line Telephony	Telephone and computer	Internet	Cable TV
Total of Households	54%	11.4%	3.4%	12.5%
Professionals and technicians	33%	43.5%	53.5%	40.0%
Directory, manager, administrator	7%	15.6%	22.9%	15.7%
Administrative businesses	6%	5.9%	4.2%	5.4%
Commercial and sales	11%	12.5%	7.6%	12.9%
Agriculture and animal husbandry	7%	3.2%	1.1%	3.6%
Transportation	7%	4.6%	1.4%	5.5%
Artisans (1)	13%	8.0%	5.5%	7.7%
Artisans (2)	3%	2.6%	1.9%	2.7%
Warehousing and shipping	1%	0.9%	0.0%	0.9%
Services	10%	2.8%	1.2%	5.0%
Not specified	0%	0.5%	0.8%	0.5%

Source: CAATEC, based on figures from the Household Survey, 2000.

It is interesting to note that, as indicated in previous paragraphs, access to ICTs seems to be related to the need of household heads to use them at their work place. In fact, while household access to fixed-line telephones is not directly related to the household head's occupation, in the case of Internet such a relationship does exist (Table 5). Therefore, the households whose heads are professionals and technicians, or those who are business managers, are the ones that have the highest proportion of Internet access from their homes.

An appropriate policy to foster Internet use in Costa Rica consists of improving access to and use of this tool in all forms of work. In this way, it would be easier for citizens to understand the importance of the Internet, not only for their jobs, but also in their daily duties. As a result, depending on buying power and the country's existing telecommunications infrastructure, Costa Ricans will be more willing to purchase this service for their homes in the future. Additionally, they would make better use of other forms of access, such as Internet cafés, schools, and municipal facilities.

CAATEC. The program is sponsored by public institutions and private enterprises. A brief description is presented in section 4 of this document.

Table No.6 Costa Rica: Household access to ICTs,
by household members using the Internet, year 2000
-figures in percentages-

HOUSEHOLD MEMBERS USING INTERNET	TOTAL OF HOUSEHOLDS	ZONE	
		URBAN	RURAL
TOTAL OF HOUSEHOLDS	3.4%	82.5%	17.5%
ONLY HEAD OF HOUSEHOLD	11.2%	9.8%	17.9%
ONLY SPOUSE	3.5%	3.6%	2.8%
ONLY CHILDREN	25.8%	26.9%	21.1%
HEAD AND SPOUSE	14.1%	14.2%	13.2%
HEAD AND CHILDREN	14.5%	16.1%	6.8%
SPOUSE AND CHILDREN	3.6%	2.9%	6.8%
AT LEAST ONE CHILD USES INTERNET	66.7%	68.3%	58.8%

Source: CAATEC, based on figures from the Household Survey, 2001

One of the most important features of the Digital Divide study is its coverage of the access that various members of a given household have to the Internet. Table 6 shows that in 66.7% of Costa Rican households connected to the Internet, at least one child uses this service. It is worth emphasizing that a child may use the Internet even if his parents do not. In fact, the proportion is more than 4:1 between this group and the group "household head and spouse" (66.7% versus 14.1%). These results remain almost the same in both urban and rural areas. Thus, the introduction of computers and Internet in schools throughout the country, regardless of geographic location, has furthered integration of many Costa Rican households into the digital age. This policy has been executed consistently by different administrations for over fifteen years.

b) Content

In spite of the high electronic literacy of its population, existance of a Digital Divide (in terms of access) between different regions of Costa Rica was shown in the last section, as well as between households with different educational and income levels. It was also found that the Internet is mostly used by youths.

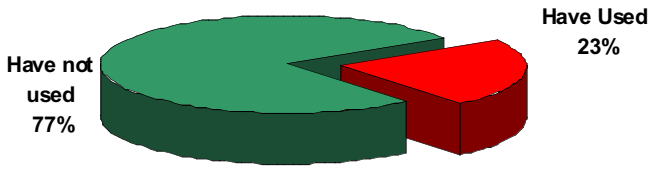
After arriving at these conclusions, it is important to complement our analysis by trying to answer the following questions: how much do Costa Ricans know about the Internet? How does the use of this tool vary by age? How is the Internet used? Two surveys carried out by UNIMER throughout the nation, one of *adults* older than 18 (February 2001), and the other of *youths* between 15 and 23 (October 2000) help answer those questions.[23]

[23] *See Appendix 2 of this document for a detailed description of the coverage of each one of the surveys*

Access to and use of the Internet by adults

In the survey of adults, it was found that more than half of Costa Rican adults were aware of the Internet. More explicitly, 67.2% of adult Costa Ricans said they were informed about what the Internet is. For the most part, people with higher socioeconomic and educational levels responded this question affirmatively. However, when asked if they had ever used the Internet or e-mail, 76.9% said they had *never* used them.

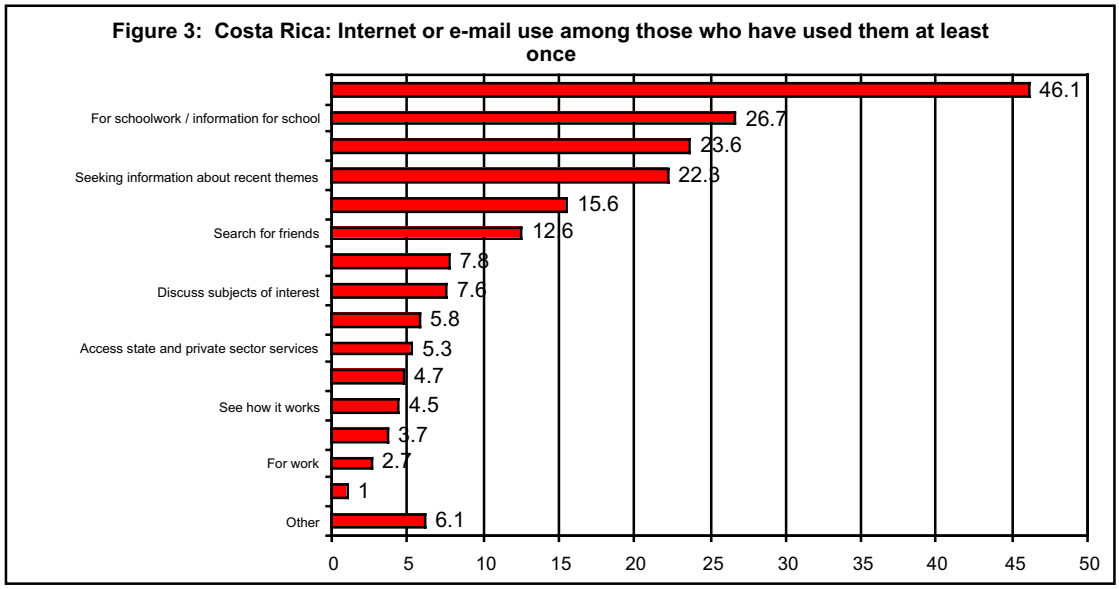
Figure 2. Costa Rica: Adults who have used Internet in their house or outside of it



Source: UNIMER (2001)

It is important to emphasize that of all adults who claim to have used the Internet or e-mail, only 33.6% have done it at their homes; this indicates that only 7.7% of adults have Internet connection where they live. Most adults who claim to have used the Internet or e-mail at their houses or outside of them, belong to a younger group, have the highest educational level, the highest income, and live in the country's Greater Metropolitan Area. This supports the findings presented in subsection a) of this section, on the existance of an important Digital Divide in Costa Rica – in this case, among the country's adult population, and it represents a true challenge for the Costa Rican society facing the need for a knowledge-based economy.

When adults were asked about what they use the Internet for, the answers were, in descending order of importance: to communicate with relatives and friends, to do school work, to browse looking for information on current issues, to request information from universities, to make friends, to shop, and to discuss subjets of interest (Figure 3).



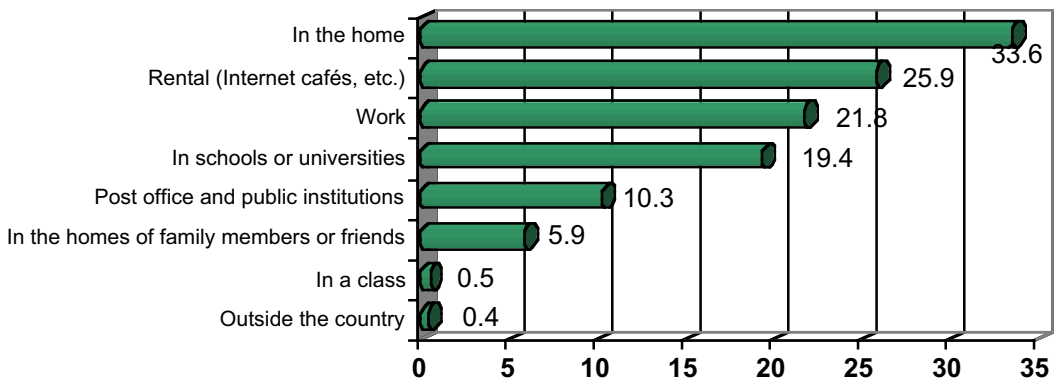
Source: Unimer (2001)

Besides using the Internet or e-mail at home, adults use it in other places, such as Internet cafés, the workplace, schools (including universities), public institutions, and at the post office (Figure 4). It can be concluded that an Internet culture is not widespread in Costa Rican enterprises, inasmuch as this is not the main place where this tool is used. In fact, only 28.2% of Internet users use it at work.[24]

The results mentioned in the previous paragraph represent quite a challenge for the Costa Rican business sector – private and public – which should carry out programs to change business culture, introducing new work methods facilitated by the use of ICTs. In fact, with the ICE/MICIT Advanced Internet project, and availability of appropriate data base systems, centralization is no longer necessary for decision-making; neither is it necessary to commute to work. Remote work methods would solve some serious problems Costa Rica faces, mainly due to urban populations which are most highly concentrated in the Metropolitan Area – traffic congestion, environmental pollution, waste of productive time while commuting to work, stress on the active population, citizen insecurity, and so forth.

[24] *CAATEC is studying this issue through a survey of 600 micro-, small and medium-sized Costa Rican businesses (PYMEs). Results of this effort will be available to the public during the first semester of the year 2002.*

Figure 4. Costa Rica: Places where e-mail is used



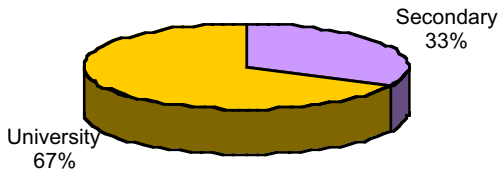
Source: Unimer (2001)

Access to and use of the Internet by Youths

The survey of youths (Unimer, 2000) shows that only 29% of interviewees are connected to the Internet from their homes. This indicates that in the group of youths Internet access from their homes is higher than that of adults. In addition, and in concordance with the findings from the survey of adults, Internet access from the home is positively related to educational and income level. In fact, 51.8% of youths with a medium-high income level have Internet at their homes, while only 28% with a medium-income level, and 12.7% with a medium-low income level have access to this service from their homes.

When analyzing household Internet access in youths (from university or high-school level) the first group surpasses the second by twice as much (Figure 5).

Figure 5: Presence of Internet in the home by educational level (n=146)



Source: Unimer (2000)

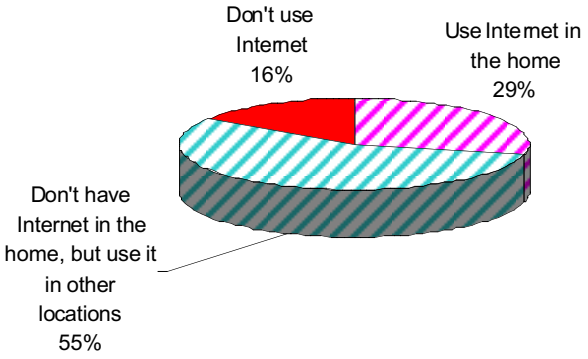
To explore the issue of other ways to access the Internet than that of access from the household, youths that did not have Internet connection at their homes were asked if

they use this service in any other place; the answer was positive in 77.7% of the cases. Therefore, the proportion of youths using the Internet (either because they have this service at home, or because they use it from other places) goes up to 84% (Figure 6), while the percentage of adults using the Internet in the same way only amounts to 23%. These results contrast significantly with the low residential Internet access found throughout the country, as shown in the Household Survey discussed in subsection a) of this section (3.4%).

In brief, if the results presented above related to Internet coverage in Costa Rica are taken as reliable, at least for these two population segments, this country has a greater Internet coverage than that indicated in the Household Survey (3.4%). These results show the importance of other alternative ways to access the Internet, different from having the service at home, and the important role of a sustained promotion of electronic literacy for the Costa Rican population for more than a decade, through programs such as that of FOD/MEP.

These results are very important for the future of Costa Rica in the face of a growing knowledge-based economy, because the public, private and academic sectors of all societies must modernize themselves in order to face challenges successfully, and take advantage of the opportunities offered to them by the third age or information society. In fact, as Burton-Jones (1999) says, to achieve success on the way to a knowledge-based economy, organizations of the various sectors of a country must change radically, and this can only happen if people have the knowledge and skills afforded to them by access to and use of ITCs (especially the Internet).

Figure 6: Internet use by youths (n=504)



Fuente: Unimer (2001b)

It is appropriate to mention that out of the group of youths who do not use the Internet, 70% said they have received information about what the Internet is. This means that 98% of the youths interviewed use the Internet service in Costa Rica, or know about it. Therefore, a policy to foster Internet use in high schools and centers of higher

education (i.e., universities) would prepare the way for increased access to this important service in the country.

Regardless of the above results, it must be borne in mind that an effective integration with the Internet can only be achieved in two ways – by increasing household Internet access in Costa Rica in a sustained manner; and by making sure that increase is comparable between different population segments: socioeconomic, demographic and genders. Accordingly, when designing a policy to fulfill this objective it is necessary to study the purchasing power of Internet service by Costa Ricans, as it is provided by ICE/RACSA in this country.

c) Purchasing power

As indicated in subsection a) of this section, the percentage of households that own fixed telephone service and a computer exceeded the percentage of households connected to the Internet in Costa Rica (Table 2). This result also appears in the survey of youths (Unimer, 2001), as well as in the survey of adults (Unimer, 2000). In fact, according to the first survey, 52% of youths who do not have Internet connection in their houses claimed to have a computer, while a similar result was obtained in 47.4% of adults who own computers. In light of these findings, it is appropriate to ask why some youths and adults who have a computer at their homes are not connected to the Internet.

In the group of youths, the reasons more frequently mentioned when asked why they do not have Internet connection at their homes even if they have a computer, were, in descending order of importance: the service is too expensive (35.5%); computers are too old or do not have a modem (15.1%); not necessary (14%); and not interested (10.8%). In the group of adults, the answers to this same question were, also indescending order of importance: service is too expensive (48.8%); not interested (8.7%); not necessary (8.6%). In short, it seems that the main reason for which many Costa Ricans do not have Internet access from their homes, in spite of owning a computer, is financial, either because of the cost of the Internet service itself, or because they have to change their hardware in order to have access to this tool).

A comparison between costs of Internet access in Costa Rica and costs in other countries such as the United States must be done cautiously, making sure that equal technologies are being compared. For instance, Internet service with access through an analog narrow-band modem in Costa Rican households costs US$15 per month for unlimited use, which is within the range of similar service costs in the United States, where cost might be between free service (i.e. Juno) and US$20. However, the factor that makes Costa Ricans think that Internet service is expensive is the cost of a local telephone connection, which is approximately US$0.60 per hour.

On the other hand, if we wish to compare the cost of Internet access using DSL broadband technology, it is important to mention that the *Advanced Internet* project of ICE/MICIT intends to establish internationally competitive rates However, it must be taken into account that such rates turn out to be very high for Costa Rican households,

given the purchasing power in these households is much lower than that of households in developed countries, where this technology is already in use.

Finally, there is a possibility of having Internet access via cable modem; but this technology is very limited in Costa Rica because there is only one Internet Service Provider (ISP), and its connection cost discourages participation of cable enterprises in the business, reducing the interest of Internet users who otherwise connect themselves through this technology. In virtue of this finding, it is not strange that an important majority of the people interviewed in the survey mentioned in this section – both youths and adults – agree that competition of Internet service in Costa Rica must be opened: 89% in the group of youths, and 49.2% in the group of adults. When asked about the type of competition they prefer, they specified mostly one where there will be participation of both private enterprises and state institutions.

There is currently a project in the Legislative Assembly aimed at legislating an opening of the Internet service (Law on the Right to Internet Access, File number 14.029), but this project will not be discussed until the next administration takes office after the national elections of February, 2002.

In summary, cost of access to Internet seems to constitute an important barrier to the use of the technology in Costa Rican homes, which would contribute importantly to the reduction of the Digital Divide. In fact, the Center for International Development (CID) in its recent publication The Global Information Technology Report 2001-2002: Readiness for the Networked World (CID, 2002), confirms this finding by placing Costa Rica in a list of countries where Internet access is relatively expensive (position 44 out of 75 countries analyzed). CID's measurement is based on average cost of 20 hours of Internet access per month *per capita* (i.e. with respect to Gross Domestic Product per person in each country). In other words, there are 43 countries, some developed and some developing, where this service is less expensive than it is in Costa Rica.

4. Policies to Confront the Digital Divide

This country unites three favorable conditions for developing policies that would make it possible to reduce the Digital Divide:

1. As mentioned previously, education is a factor that promotes and facilitates access to and use of ICTs. Costa Rica has literacy rates similar to those in developed countries, special educational programs with widespread coverage of computing subjects (FOD/MEP); an important percentage of students who study English as a second language (50%); 46 private universities and 4 state universities. Also, according to the UNIMER survey (2001), 67% of Costa Rican adults claim to have received information about what the Internet is.
2. During the last few years, inflow of direct foreign investment, especially in the high- technology sectors, has been very significant, representing up to 5% of the Gross Domestic Product in a year. Most investments have been in the area of high technology; Intel, Baxter, Conair, Trimpot, Abbot Laboratories

and Photocircuits stand out among other firms. This phenomenon has had a considerable impact on our economy, up to the point where the most important export sector is that of high technology. Associated with this, there has been a significant development of the software industry in the country (with Costa Rican capital) aimed at exportation. This has certainly happened as a result of the quality of Costa Rican human resources, as well as of the implementation of a policy of *zero import taxes* on ICTs. The development strategy has thus consisted of supporting production of technology- and knowledge-intensive goods and services. It is worth noting that the Human Development Report (UNDP, 2000), focused on the issue of how technological innovations foster human development, classifies countries into four categories: leaders, potential leaders, dynamic followers, and excluded with respect to technology. Costa Rica falls in the category of *potential leaders*, placed in position 36 out of the 72 countries analyzed in the report. This important classification is due, in a great deal, to the relative importance of high technology exports in the country's total exports.

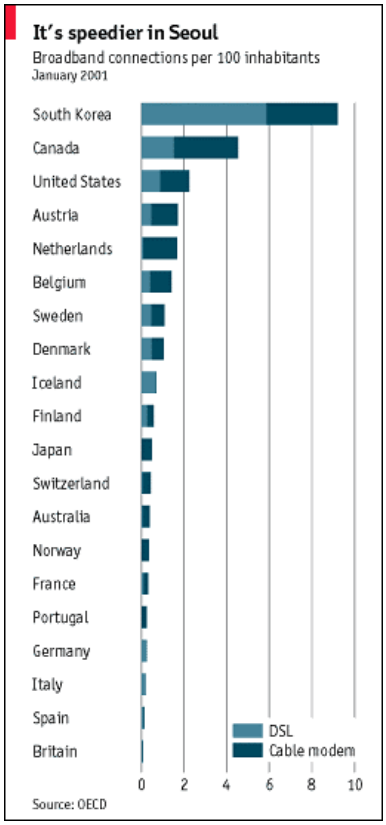
3. Costa Rica is the only country in the region in which the government still has a monopoly in telephony and Internet connectivity. According to some experts, this factor constitutes an important limitation for the country's competitiveness and technological advance (World Economic Forum, 2000 y IDB, 2001). Yet having a State Telecommunications institution may also be considered as in some senses a positive element, inasmuch as policies created by the Ministry of Science and Technology aimed at closing the Digital Divide are executed by the government in a timely and efficient manner. But such policies would work even better in a competitive regime.

In Costa Rica, policies related to increased Internet access and use may be classified in three groups: those that are directly related to reducing access costs; those that intend to include the use of the Internet in education, health and digital government; and lastly, those aimed at universalizing the use of the Internet, with participation of the public sector, local governments, and the civil society.[25]

In the particular case of the Central Government, authorities have been implementing a series of policies aimed at fighting the Digital Divide on three different fronts.[26] The first aims to increase Internet bandwidth and reduce its cost, providing a first-class infrastructure to Costa Rican users.

[25] *Two national programs stand out: the first one called "Jóvenes @ todo dar" (Top-quality Youth), designed by the Paniamor Foundation Center for Juvenile Alternatives, which seeks to integrate youths from urban, socially excluded communities into a development model that would allow them to adopt technology as a development tool; the second, an internationally recognized program known as LINCOS, from the Entebe Foundation and the Costa Rican Technological Institute, which intends to improve the life quality of people in remote zones of the country, using specially designed modules that provide computing laboratories, telemedicine, and other ICTs-based community services. This project has been carried out with great success in the Dominican Republic, with the support of MIT.*

[26] *In effect, the Rodríguez Echeverría Administration has worked on a much more extensive Digital Agenda, to help turn Costa Rica into a true "Knowledge Society". Five areas make up this Digital Agenda, the last one of them being "e) Generalizing Internet access in such way that its benefits reach the largest*



In fact, authorities have been working in a project called "Creation of an Advanced Internet", whose main purpose is to not only increase high-bandwidth coverage in the country, but also to reduce the cost of Internet access for businesses, as well as for households and academic institutions. The Ministry of Science and Technnology estimates that there will be significant reductions in Internet service fares in the short term (within one year) due to this project, as well as a quantitative leap in the number of broadband users in the country, placing Costa Rica in third place, after South Korea and Canada in broadband coverage (2.75%; see figure to the left for comparative data[27]).

As a complement to this effort, several government bills have been presented in the Legislative Assembly seeking to promote in one way or another universal and safe access to the Internet in Costa Rica.[28] The Government Bill on the Right of Access to the Internet (File number 14.029) is critically important because existence of more Internet Service Providers (ISP) would facilitate the introduction of cable businesses as ISPs, which would increase coverage in Costa Rica as it has happened in other countries. This result can be seen in the above figure, where cable modem access constitutes an important techological tool in developed countries such as the United States and European countries.

On the second front, access to the Internet in Costa Rican households and businesses has been promoted through a credit program called "Internet Ready", which is part of a strategic alliance between ICE/RACSA, and the Banco Nacional de Costa Rica. This credit line allows the financing of purchases of computing equipment with access to

possible amount of people", which deals with the subject of the Digital Divide. For a full presentation of the Costa Rican Government Digital Agenda see Programa Impulso (2001).

[27] *"Broadband Blues"; The Economist 6/21/01 (www.economist.com/ displayStory.cfm? Story_ID=666610)*

[28] *Enactment of the National Day of Intellectual Property; File number 14335. Government Bill on Internet access; File number: 13888. Promoting Productivity by including computing technology; File number: 14274. Digital Signature and Digital Certificates Law; File number: 14276; Public Administration Constitutional Law. The Public Adminstration Constitutional Law project mentions in its general principles users rights, using electronic means as an ideal tool to simplify administrative operations and services, and increased transparency and citizen participation. The following laws of the Republic were also passed: Law on Intellectual Rights with amendments (Law 7979) that protects the rights of reproduction, lease, use, sale or offer to sell among others, as well as various rights protecting digital technology. Law number 8039 on Compliance/ Observance Procedures includes precautionary and judicial measures to protect these types of rights, specifically those of intellectual rights and offenses against digital technology.*

the Internet, training on its use, and a minimum access time.[29] Even if results of this iniciative are not as good as expected, partly due to the high costs of Internet access mentioned previously, it is expected better results will be realized when the Advanced Internet project is implemented.[30]

The last front in the fight against the Digital Divide, but not the least important, is the *Communication Without Borders* program, a national project to promote access to and use of ICTs by Costa Rican citizens, regardless of their social condition and geographic location; it also seeks to strengthen a national culture of use electronic mail and the Internet as tools to support democracy, accountability and social administration.

The *Communication Without Borders* program is coordinated jointly by the Presidency of the Republic and the Ministry of Science and Technology, and executed by CAATEC, due to its importance and to its social and interinstitutional nature, which dictates an integral and articulated execution between the different institutions. The program is sponsored by the following institutions:

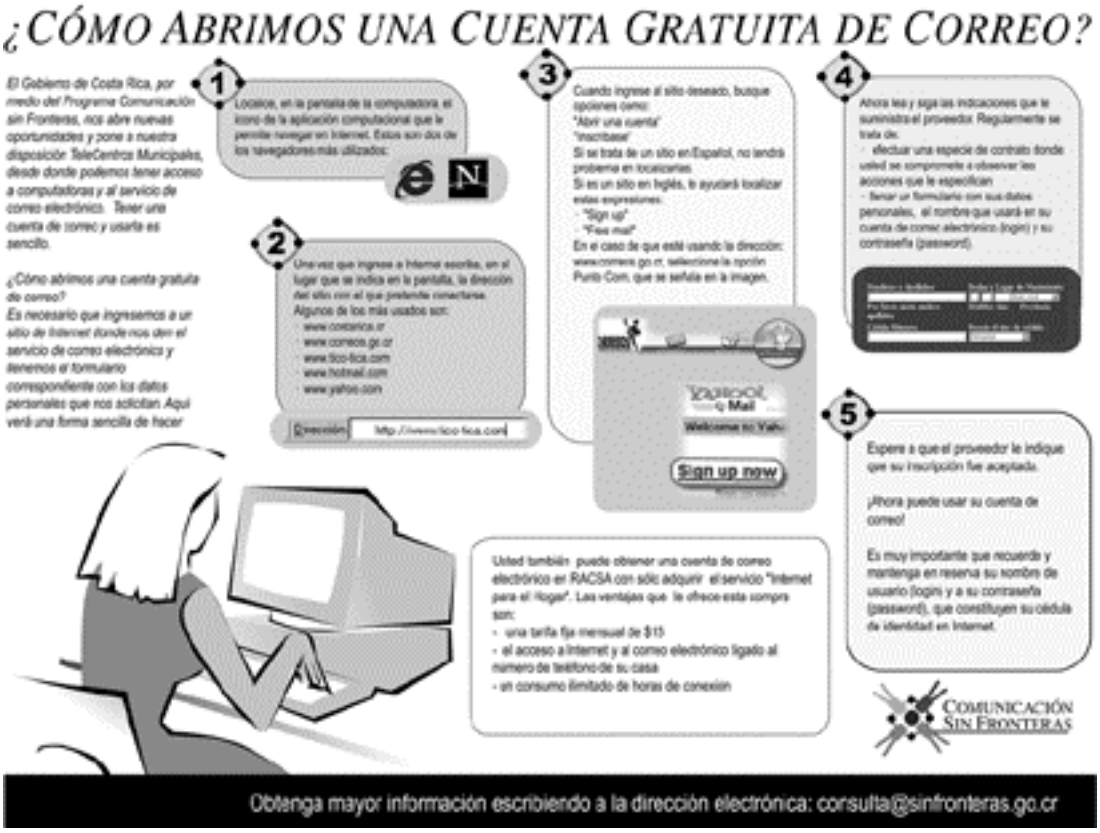
- The **Banco Nacional de Costa Rica:** will provide computing equipment and technical assistance for Internet Banking services.[31]

- **Correos de Costa Rica:** will provide commercial infrastructure and personnel to assist in training in thirty branches. It will also supply equipment for the central offices of Correos de Costa Rica, and branches of Alajuela, Heredia and Cartago as well as copies of the promotional and didactic material of the program.[32]

[29] *Features of this credit line include a 60-month term and a 25% interest rate; it may be activated with the client's Bank credit card – in other words, it is considered to be a credit card special transaction .*
[30] *In fact, according to figures from the Banco Nacional de Costa Rica, only 57 operations have been formalized since the Internet Ready credit line was implemented.*
[31] *Banco Nacional de Costa Rica. Board of Directors Article 30, Session 11.098 of July 3, 2001.*
[32] *Correos de Costa Rica, Board of Directors Accord number 1508, Special Session No. 261, September 13, 2001.*

- The **Instituto Costarricense de Electricidad (ICE):** will assume the connectivity costs of the 187 telecenters.[33]

- **Radiográfica Costarricense S.A. (RACSA):** will provide free e-mail service to all Costa Ricans, through increasing the number of e-mail accounts and expansion of the necessary hardware and software.

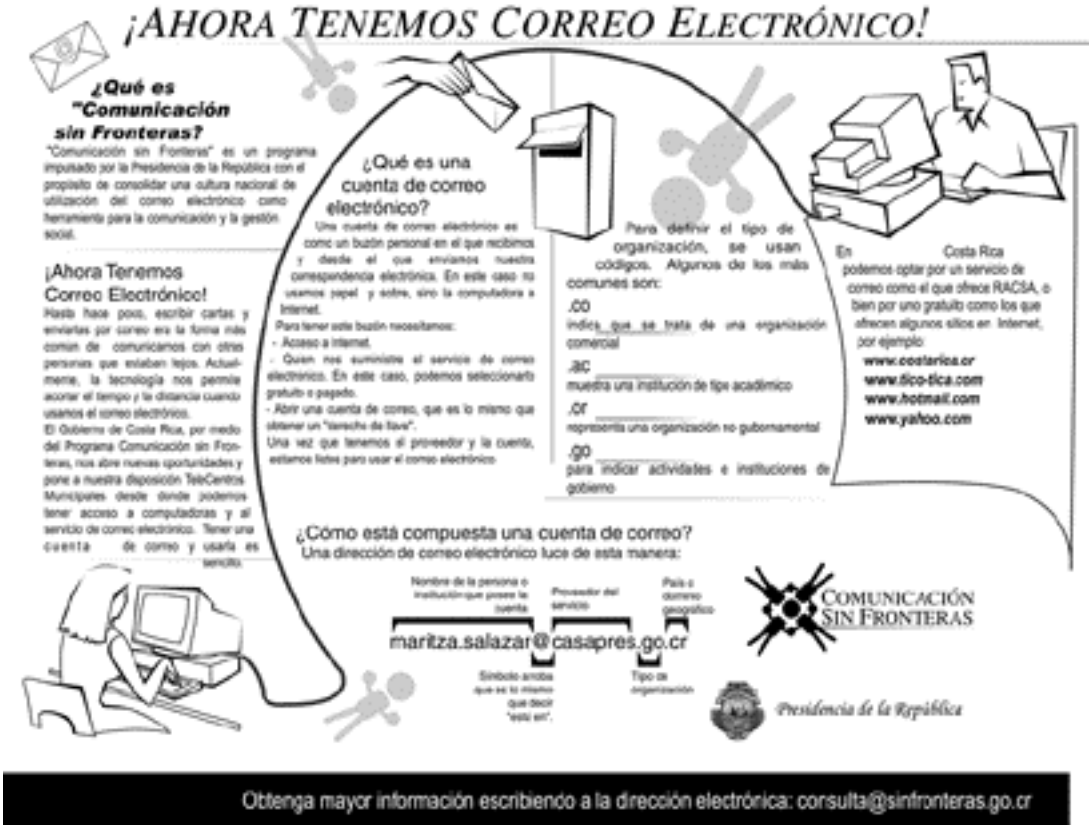


In addition, other institutions are participating actively in the program, such as the Ministry of Justice, the Supreme Election Tribunal, the Ministry of Public Education, the National Registry, the Omar Dengo Foundation, the National Learning Institute, the Instituto de Fomento y Asesoría Municipal (IFAM – the Institute for Municipal Promotion and Assistance), the National Radio and Television System, the Childrens' Museum, the United Nations Development Program, the Junta de Protección Social (the Social Welfare Board) , and public and private Costa Rican universities.

The program's objectives may be summarized in three general points: (i) To develop a public policy to promote the importance of Information and Communications Technologies (ICTs), with the purpose of fostering a national culture that values and uses opportunities that they provide; (ii) to promote training in the target population, to ensure use of ICTs in a practical, democratic and uplifting manner; and (iii) to foster creation of

[33] *Instituto Costarricense de Electricidad. Board of Directors session of December 4, 2001.*

187 telecenters[34] as parts of human networks and useful means to assist in citizens' daily tasks and provide information exchange, Internet banking, promotion of culture and democratization of the Internet, with the participation and accountability of local governements.



As of the the date of writing of this document, there are 52 telecenters already operating, and 120,000 e-mail users. The Omar Dengo Foundation is charged with preparing teaching materials and training schemes to create a national culture for using ICTs. Training consists of designing and executing 40-hour courses for 120 municipal promotors, and 120 representatives of institutions involved in the program, to promote use and uptake of ICTs at the community level throught the University Community Service programs of the National Learning Institute (INA), the IFAM, the Ministry of Public Education (MEP), and public and private universities.

A fundamental aspect of the Comunication Without Borders program is the idea that with time, each telecenter will take over the development and management of the program in its facilities. This effort to internalize and sustain the program will be based on seminars and workshops developed with this aim in mind. An equally important endeavor is to present and organize the functions of the principal program promoters so that with support from telecenter administrators they can draw up plans for local activities aimed at making the project sustainable to the benefit of all Costa Ricans.

[34] *There are many ways to define telecenters. For the purposes of this work, they are defined as places equipped to provide access and training forICT use and uptake.*

The program has three well-defined activities to achieve its objectives: (i) an efficient *collaboration with institutions charged with the program's execution*, which will ensure its continuity and practical, useful and uplifting nature; (ii) a *promotion and divulgation strategy* centering on the importance of ICTs in all spheres of the country, seeking to create a national culture that values and uses the opportunies they provide; and (iii) an *integrated training system* for the target population.

As part of the divulgation and training activities, the project will be promoted by means of advertisements included in telephone and electricity bills, in lottery tickets, in educational sheets inserted in mass media, posters, and radio and television releases. Training will be provided through 240 "trainers" at telecenters and institutions participating in the program.

Thanks to the program's focus, which emphasizes promotion and organization of efforts from Civil Society, it has been possible to integrate multiple community associations within its framework, including the Asociación de Amigos de la Educación (Association of Friends of Education), Coronado Conectado (Coronado Networked), and Internet cafés, among others.

The program itself involves creation of a portal (www.costarricense.cr) which has links to systems of sponsoring institutions, access to multiple services of digital government, digital banking, and training on how to use e-mail. It is expected that within the first year of the program's execution (2002), 20% of the population will use e-mail and Internet regularly, 131 telecenters will be installed, and at least 100,000 people per month will use the services provided in telecenters.

We can conclude from the above discussion that policies designed by Costa Rican authorities, as well as by private efforts seeking to fight the Digital Divide, have yielded an efficient use of resources – they have been careful to avoid duplications and have instead supported each other in efforts that different institutions and businesses are carrying out to help Costa Rica in its transition towards a knowledge-based economy. However, given that the main policies are still in their first stages of execution – as in the case of the Advanced Internet project, and the Communication Without Borders program – it is too early to claim success.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ICE
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RACSA

5. Main Findings and Recommendations

A. Because those individuals with a greater purchasing power have more access to Information and Communications Technologies (ICTs), and can increase their productivity and wealth thereby, there is a real possibility that income disparity will occur within a given country, as well as between countries. This new element is known as the *Digital Divide*, and given its socioeconomic implications it is important to study the phenomenon in Costa Rica. In other words, the existance of a gap between citizens who have access to ICTs and those who do not have access to these tools might cause sociopolitical instability in the future, because all citizens do not enjoy equal opportunities. To understand this, it is sufficient to imagine how different Costa Rica would be in its social and political aspects if elementary education had not been free and compulsory for more than one hundred and fifty years, and high-school education free since 1949 (even though it is not compulsory). There are good reasons for the United Nations (UNDP, 2001) to argue that technology is like education in allowing people to rise out of poverty through their own efforts. Technology is a tool for growth and development, not only a result of it.

B. Currently, the degree of development of any nation depends on its people's use and access of ICTs. In fact, along with globalization, ICTs constitute a valuable tool for economic growth and poverty relief in developing countries like Costa Rica.

C. The existance of a Digital Divide in Costa Rica is evident between different geographic zones, between youths and adults, and between groups of people with different educational and income levels. This gap is not only related to Internet access, but also to access to other ICTs. It is necessary to make a major effort to close this gap in the short- and medium-term, thus avoiding the existance of two Costa Ricas: one with access to ICTs and the other without it.

D. Internet access is very limited in Costa Rican households, with only 3.4% of them enjoying this service. However, Internet use is much higher than expected given such coverage, because it was estimated that 84% of youths and 23% of adults have used the Internet at least once in their lives. In other words, thanks to the existance of the Omar Dengo Foundation and the Ministy of Public Education, electronic literacy programs (which have been carried out for over ten years), and alternative ways to access the Internet (from the work place, Internet cafés, schools and municipal facilities), access to and use of this tool is much greater in Costa Rica than shown by figures from the Household Survey. For this reason, initiatives to promote Internet access and use by all Costa Rican citizens (such as the program Communcation Without Borders, carried out jointly by the MCIT and CAATEC), should count on the unfaltering support of all the country's sectors.

E. Internet use as a tool in daily duties by Costa Ricans is still in its beginning stages, especially considering that in Costa Rica it is mainly used for communication with friends and relatives (e-mail), and to a lesser degree in business (business-to-consurmer or business-to-business), school work, and

work at home. This seems to be associated with the fact that there are not enough Internet Content Providers (ICPs) in Costa Rica, and that developed countries are the leaders in this field. As a matter of fact, most Internet content is written in English, and has been created in developed countries. A policy aimed at building a bilingual society (Spanish and English) in Costa Rica would help a great deal in this area, as well as participation of public and private authorities and institutions, to include content in the Internet that is truly valuable for Costa Ricans.

F. There was no evidence found of intensive use of the Internet at work places by heads of households in Costa Rica. This could possibly be related to the lack of a digital culture in local businesses, a subject that CAATEC is studying in greater detail in another effort. However, it is worth noting that this preliminary finding implies a substantial challenge for the Costa Rican business sector, which must carry out programs to promote cultural change, introducing new work methods facilitated by ICTs, in this way supporting a successful transition of Costa Rica into a knowledge-based society or a knowledge-based economy.

G. Even though an important Digital Divide has been identified in Costa Rica, the country's environment is favorable for improving people's access to and use of ICTs, especially access to and use of the Internet. In the first place, the country has a high rate of digital literacy. In the second place, prominence of the High Technology sector (involving local and multinational businesses), including the software industry and its future expansion, constitutes an important source of training and motivation, so that many Costa Ricans will want to enjoy Internet access at their homes. Lastly, having a Ministry of Science and Technology that governs everything concerning access to and use of ICTs in the country, facilitates design and implementation of projects and programs to actually fight the Digital Divide.

H. One of the projects designed jointly by the MCIT and ICE is the Advanced Internet, which would allow Costa Rica to achieve a quantitative and qualitative leap in the short term (within one year), by making it possible for more than one hundred thousand new Internet users to connect to the Internet through high-speed Digital Subscriber Line (DSL) technology. Then, for instance, if centralization is not necessary for decision-making in many activities, this network would allow Costa Ricans to avoid commuting physically every day to the work place. Remote work methods would solve many serious problems that Costa Rica is facing, mostly in urban concentrations: traffic congestion, environmental pollution, loss of productive time in commuting, stress in the active population, citizen insecurity, etc. As a consequence, the Advanced Internet project must be deemed a priority by current and future governmental authorities, in the benefit of all Costa Ricans. Any excuses for behavior that hinders this initiative's success should not be accepted.

I. Existance of a continuing education system is crucial to succeed in the information society. To this end, universities and other educational centers

must make great efforts to design programs accessible to all Costa Rican professionals from their own homes and offices, without having to commute to the campus itself. The Internet allows a great variety of remote educational methods to be implemented. In this way, "knowledge-society workers" will be able to stay updated from their own offices, homes or any other place from which they can connect to the Intenet (Internet cafés, municipal facilities, libraries, telecenters, etc.).

J. Two obstacles to increasing Internet access in Costa Rican households have been identified: the first is the cost of telephone service, which is very expensive according to both interviewees' opinions in the surveys for this study, and to the comparison with other countries for the same type of service. (This in spite of the fact that the cost of Internet access in Costa Rica seems to be at a competitive level internationally). The second obstacle is the low incidence of Internet connection via cable modem compared to the situation in other countries such as the European countries. This could be due to the lack of enough ISPs, whose presence would assure that connection costs that cable enterprises pay is very competitive, so that it is easy for more of these businesses get interested in offering Internet access to their clients. The Bill on the Right to Access the Internet (File No. 14.029) constitutes an important effort in this direction.

K. Although pointing out the magnitude of the Digital Divide in Costa Rica and commenting on the policies adopted to fight it is important, creating a follow-up mechanism to measure achievement of the policies' objectives is crucial to succeed in this social challenge. On this account, we recommend that, as is done in other countries, the National Statistics and Census Institute (INEC) include in the Household Survey carried out every year the same group of questions that made the present study possible, in order to obtain the necessary information on access to and use of ICTs in Costa Rica to evaluate its evolution through time.

L. In order to increase people's confidence in the use of the Internet as a tool to carry out financial, commercial and other transactions, it is necessary to create a Technical Department that would study and make suggestions on policies for an effective fight against elements that discourage Internet use by citizens, including viruses, hacker intrusion, intellectual rights on the network, and electronic fraud. Said Department must be constituted of public workers, the private sector and academics, and be duly recognized by Costa Ricans as a neutral, apolitical and technical entity.

M. The sharing of experiences between Costa Rica and other countries relating to the fight against the Digital Divide will allow them to share the positive aspects of national policies, and simultaneously to obtain information on new ways to face this challenge. With this in mind, governments, private and academic sectors, and international organizations must encourage all available mechanisms to share information about these efforts throughout the world. This would facilitate knowledge transmission in an area vital to the progress

of nations. An effort to maintain programs such as the World Bank's *Info*Dev and other similar programs should be pursued.

N. Perhaps the most important conclusion of this study is that Costa Ricans are at a crossroads: we can choose between leaping towards a successful knowledge-based economy with marginal effort and cost, or accepting being a poor twenty-first century society. The good news is that we have many tools to achieve the first objective; whether we achieve it or not will depend on ourselves.

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Appendix 1

Number of Educational Centers and total of boys and girls benefitted by the Educational Computing Program MEP-FOD 1988 – 2001 [35]

Year	Total of Educational Centers	Total of boys and girls benefitted
1988	57	61,570
1989	107	86,203
1990	127	111,000
1991	127	111,000
1992	157	138,640
1993	157	139,750
1994	164	142,880
1995	171	143,420
1996	181	148,400
1997	181	148,000
1998	382	213,084
1999	383	219,159
2000	400	225,113
2001	434	252,935

Notes:

1. The total of educational centers refers to schools active at the end of each year. Starting in 1998, the total of educational centers includes educational centers with a laboratory, as well as schools with only one teacher (the "Computer in the classroom" model).
2. The total of children covered includes boys and girls in preschool, elementary school (grades 1 through 6), and "integrated classrooms".
3. The initial process of establishing the Educational Computing Program MEP-FOD in 157 educational centers was carried out in three consecutive stages between 1988 and 1992.
4. Schools that owned their own computing equipment were included in the program, starting in 1994. This explains the growth in the amount of educational centers covered between 1994 and 1997. This process continued after 1997.

[35] *Source: Information System of the Educational Computing Program MEP-FOD, Omar Dengo Foundation, Februrary, 2002.*

5. The project to expand and consolidate Educational Computing 21, which was carried out during 1996 and 1997, started installing new and replacement equipment at the beginning of 1998, and ended in December of that year. This expansion project added 116 elementary educational centers to the program, replaced the equipment in 121 existing laboratories, and installed computing equipment in 69 one-teacher schools ("Computer in the classroom" schools). In addition, 7 Eduational Units were integrated to the program, which received new equipment from the project.
6. During the years 2000 and 2001 five expansion projects were developed to cover a total of 111 educational centers. At the end of the year 2001, a total of 51 of these centers were active under the program, while the rest were in the process of building the necessary infrastructure to install their respective laboratories.

Appendix 2

Details from the UNIMER Surveys of Youths and Adults in Costa Rica

The two surveys used in the discussion of subsections b) and c) of section 3 (Unimer 2001 and Unimer 2000), present the following characteristics with respect to coverage and degree of confidence.

Survey of Adults (Unimer, 2001)

The survey was carried out between February 1 and 10, 2001. In this national opinion survey 1198 Costa Ricans were interviewed throughout the country. A structured pre-codified questionnaire was used in most of the closed questions.

Sample Framework

The map based on the Population and Housing Census of June 1984 (updated in 1986), provided by the National Statistics and Census Institute, was used as the sample framework. The Institute also provided basic information on the framework, which was worked with on a personal computer. This file containing this information is arranged by provinces, cantons and districts, following the country's administrative territorial division. At the same time, districts were subdivided into areas with approximately 60 houses, known as census segments. The data on each one of these census segments contains the number of houses, number of residents in each house, and the level of urbanization – urban, urban periphery, concentrated rural, and dispersed rural – assigned by the National Statistics and Census Institute after the 1984 census. In addition, each census segment of the urban area was classified by socieconomic level into one of three groups: high, medium and low.

The number of houses in each of the regions at the beginning of 1996 was estimated in order to distribute the sample between the five geographic zones specified for the study. For this purpose, the growth rate of the number of households was estimated for the period 1990-1996, based on data from the Household Survey carried out every year by the National Statistics and Census Institute. This provides a more up-to-date estimation of changes in number of households than the estimate based on estimated growth rate in the inter-census period.

The arithmetic, geometric and exponential growth rates were estimated based on number of households reported in the Household Census. The largest one of them – the arithmetic – was later selected and applied to the number of households that existed in each one of the zones according to the 1984 Population Census. The well-accepted premise that population grows in an exponential manner was taken as a base and applied to the rate selected in each one of the regions of this exponential model.

The estimated number of households in each region[36], the proportion of the country they represent, and the number of interviews to perform in each one of the zones was as follows:

Region	Households	Proportion	Number of Interviews
Metropolitan Area	236,232	0.269	322
Rest of the Urban Central Valley	100,360	0.137	164
Rest of the Rural Central Valley	162,120	0.224	269
Rest of the country - Urban	69,480	0.107	128
Rest of the country - Rural	203,808	0.263	315
Total	772,000	1.000	1198

Therefore, the resulting sample was self-weighted.

Sampling Scheme

Selection of individuals to be interviewed was carried out using the mapping from the General Directorate of Statistics and Census, as well as basic information from the sampling framework. A probabilistic multistage sampling design, stratified by geographic zone, was applied. Households from throughout the national territory were divided into five groups, in order to stratify the sample:

1) Metropolitan Area
2) Rest of the Central Valley – Urban
3) Rest of the Central Valley – Rural
4) Rest of the country – Urban
5) Rest of the county – Rural

In the five levels, the primary sampling units were census segments selected based on probability proportional to size (PPS). Compact randomly selected segments of fifteen (rural zones) or ten (urban zones) households were chosen in each one of the census segments.

For each compact group, interviewers had a detailed mapping of the sector, with an indication of houses to be visited, as well as the order in which visits were to be paid.

The sample's size was 1198 individuals; this allows for a confidence level of 95%, and a maximum error of 2.8 percentage points.

[36] *Source: INEC Household Survey. July 1996*

Fieldwork

Even though Unimer's personnel has a great deal of experience, its supervisors and interviewers received training before the field work was carried out. The functioning of the survey tool was discussed during this training, and supervisors, interviewers and Project Director functions were reviewed. A pilot test was carried out to evaluate the questionnaire, as well as the interviewer's capacity to administer it. The necessary corrections were made to the instrument after the test results were available.

The field work was carried out with 24 interviewers divided into four groups. Each of these groups had its respective field supervisor, who acted as the group's director and as the person in charge of ensuring the quality of the information collected. Staff Direction and coordination was under a Director of Projects and a Director of Field Work.

During this fieldwork, most questionnaires were reviewed by supervisors. Also, once in the office, part of them were subjected to telephone checkups to verify identification data, and in general, the way in which the interview was done.

Data Processing and Tabulation

All questionnaires were subjected to a phase of manual criticism, seeking to review the logic of the answers and to correct defective entries. Then answers to open questions were codified.

Once again, all the questionnaires were reviewed and then entered. The criticism, codification and entering of data were done simultaneously – as questionnaires from different segments came in, they were reviewed and then entered.

The Data Entry application from SPSS/Windows, Version 6, was used to enter data into microcomputers. Data entry was evaluated with this same package, verifying all the questionnaires. Finally, tabulations were obtained, also using this package.

Sample Description

The sample consists of 49.2% men and 50.8 % women. The age group with greatest representation is from 30 to 39 (25.5%), followed by the group between 18 and 24 years old (20%), and the group between 50 and 65 (21.6%). The group between 40 and 49 represents 17%, and interviewees between 25 and 29 years old represent 14.2%.

By socioeconomic level, 42.4% of respondents belong to the mid-middle class, 44.4% to the low- and middle- low class. Finally, 13% of respondents belong to the middle-high and high class.[37]

[37] *Socioeconomic level was obtained beginning with a composed index based on family income, educational level, occupation of head of household, and ownership of certain articles in the household. It was assumed that the combination of these four factors represent a more exact profile about the*

By geographic zone, 28.0% of the sample corresponds to the San José Metropolitan Area, 13.9% to the Rest of the Central Valley-Urban and 21.0% to the Rest of the Central Valley-Rural. The country's Central Region represented 62.9% of the total interviewed. On the other hand, 10.9% of the sample comes from the Rest of the Country-Urban and 26.4% from the Rest of the Country-Rural. By zone, 52.8% of respondents live in urban zones, and 47.2% live in rural zones.

With reference to educational level, the larges group consists of people without any education, and those with partial or complete elementary education (42.7%), followed by the group with partial or complete high-school education (36.3%), and those with partial or complete university studies, or portgraduate studies (21.9%).

Survey of Youths (Unimer, 2000)

A national telephone survey was carried out between October 19 and 23, 2000. A structured and precodified questionnaire was used with closed-response questions. Five hundred and four men and women were interviewed, residing throughout the national territory, from all socieconomic levels, between 15 and 23 years of age. Fifty percent of pollees are/were men and 50% women. Out of the total of individuals interviewed 50% belong to the mid-middle socioeconomic class, while 28% belong to the mid-low/low class and the remaining 22% belong to the mid-high/high class.

The sample size permits a 90% confidence level with a maximum error of 3.7 percentage points. The sample includes equal percentages of university students (50%) and high-school students (50%). Two hundred and fifty-four interviewees are in the last year of high-school, and 254 are in the first or second year of university education (or technical professional education). The size of the sample of each subgroup allows for a 90% confidence level, with a maximum error of 5.2 percentage points.

interviewee's socioeconomic origin. There were points assigned to each one of the categories of the four variables, one being the lowest and seven the highest. Then a socioeconomic index was created (composed score) by adding the values for each individual in the sample. Then a model for social stratification was obtained from this index.