**International Telecommunication
Union**

**Pan American
Health Organization**

# TELEHEALTH
# IN THE AMERICAS

**Inter-American Telecommunication Commission**

**Organization of American States**

I

**FOREWORD**

**MARTHA ELENA PINTO de DE HART**

**Minister of Communications of Colombia**
**Chairperson of the Permanent Consultative**
**Committee I of CITEL**

It is my great privilege and honor to introduce to the international community the Book on Telehealth in the Americas, through which Permanent Consultative Committee I (PCC.I) seeks to disseminate the results of efforts under way in the health sector to reach the most remote communities of our Hemisphere, while pointing to the contribution of the telecommunication sector in meeting the most urgent needs of deprived sectors of the society of the Americas.

Particularly vital in ensuring the quality of the document was the participation of the Pan American Health Organization, the International Telecommunication Union, distinguished institutions such as the National University of Colombia, and major medical organizations.

This document is one of the studies on universal service promoted by PCC.I with a view to bridging the digital divide among countries of differing levels of development, a divide that isolates large segments of the society of each.

Clearly, this situation can only be overcome through appropriate use of information and telecommunication technologies in resolving specific difficulties. A prime example of this is the health sector, where such instruments are creating an opportunity to provide medical care in remote communities and enhance quality of service, the benefits of which are evident in the text I am gratified and proud to present.

**MARTHA ELENA PINTO de DE HART**
**Minister of Communications of Colombia**
**Chairperson of the Permanent Consultative Committee I**
**CITEL**

**FOREWORD**

**HÉCTOR MARIO CARRIL**

**Chair of the Working Group on Basic and Universal Telecommunication Services of CITEL (1998-2002)**

The Book on *Telehealth in the Americas* is the outcome of efforts made by the Working Group on Basic and Universal Telecommunication Services of CITEL, following the example of previous books: *Universal Service in the Americas* and *Tele-education in the Americas.*

In this Working Group we had observed that one of the objectives of the policies of universal access was aimed at extending different applications of other services with the support of computer technologies and telecommunications, which are in turn essential to meet the basic needs of the population, including as an alternative to other service delivery schemes involving higher costs or lesser scope in terms of the number of the users covered.

Furthermore, Telehealth in itself implies an advance in improving welfare delivery practices and methods, as well as teaching and disseminating medical breakthroughs to a higher number of users, whether professionals, other health workers, patients, or the entire population benefiting from various health programs.

With this book we intend to show the many telehealth projects being implemented in the different countries of the Americas, differentiating the means that each project can afford, the activities, the areas, and the specialties of the value-added services provided using distance schemes, and examining the different sources of funding. We also provide a brief description of the health situation in the countries of the Americas so as to have elements for comparison and determine the investment efforts made in the health sector. Finally, we give an idea of the investments made in the telecommunication sector, as well as an overview of the facilities that are available for the implementation of telemedicine and telehealth projects in general.

Our aspiration is to visualize and analyze how the different countries and their institutions, whether public or from civil society, the academic sector or private enterprise, have been trained to manage information and communication technology (ICTs) in the health sector, especially for telehealth activities and services.

In this publication, the reader will find descriptions of a range of projects, from the most advanced and recently implemented to the first historical documents on the budding application of medicine combined with telecommunications in Latin America, such as the use of television at the VII International Congress on Surgery, held in Buenos Aires in 1950, for the live transmission of operations conducted at the School of Medicine of the city's National University.

The attendance of high-ranking national authorities of the Argentine Republic at that event, especially the Minister of Health of the Nation, Dr. Ramón Carrillo, and the First Lady, María Eva Duarte de Perón, highlighted the importance, in terms of state policy, that was being given at the time to the newly forged alliance between telecommunications and medicine.

In this book we are also presenting several other projects, such as publications, symposiums, and seminars on telehealth by international telecommunication and health organizations, as well as by private telecommunication companies and associations. The main publications in this field issued by the Pan American Health Organization, the World Health Organization, the International Telecommunication Union, and the Latin American Association of Research Centers and Telecommunication Enterprises, can also be found here.

I hope this work, which was carried out in the framework of the mandates given by the Summit of the Presidents of the Americas to CITEL and their recommendations to the administrations, as well as in the purposes of the World Summit on the Information Society, will contribute to promoting greater access of health organizations and administrators to the use of technologies applied to telehealth and will foster better policymaking to reduce the disparity in the access to health in the Americas.

I wish to thank CITEL for having given me the responsibility of carrying out this project, as well as the International Telecommunication Union and the Pan American Health Organization for having participated in it and the Latin American Association of Research Centers and Telecommunication Enterprises for its collaboration. I also wish to extend my appreciation to all the governments of the Americas for their contributions and to all the experts who collaborated in preparing this book in its printed version and multimedia version.

It is the aspiration of all those who participated in this project that this publication will make a positive contribution to the development of telehealth in the Americas, consolidating the commitment to a reform of the health sector based on solidarity. With the support of these new options, this reform will be able to contribute to reducing existing disparities of access, as it is aimed at highlighting the concern for the essential functions of public health, quality care, equality of access to services, and coverage of these services, in a process that will enable our people to become part of the knowledge society on the basis of guarantees for health without exclusions of any kind.


**HÉCTOR MARIO CARRIL**
**Chair**
**Working Group on Basic and Universal**
**Telecommunication Services of CITEL (1998-2002)**

**FOREWORD**

**HAMADOUN I. TOURÉ**

**Director**
**Telecommunication Development Bureau**
**International Telecommunication Union**

We are pleased to launch this publication on Telehealth, which is the result of a cooperative effort between the Telecommunication Development Bureau (BDT) of the International Telecommunication Union (ITU),  the Inter-American Telecommunication Commission (CITEL) of the Organization of American States (OAS), and the Pan American Health Organization (PAHO), which serves as the Regional Office for the Americas of the World Health Organization (WHO). The invaluable contributions made by Latin American Association of Research Centers and Telecommunication Enterprises (AHCIET) are also immensely appreciated.

The Telehealth Book introduces what has become a new and topical dimension with respect to health-care delivery in the Americas Region. It is hoped that, this publication will serve as reference material for governments, academia, private sector, and all those involved in both primary and tertiary healthcare. Through telehealth, remote data access, health-information sharing and medical support as well as clinical examination, diagnosis and treatment are made possible. As evident in this book, up until recently, telehealth has tended to be viewed as a concept limited to the use of information and communication technologies to deliver health services, expertise and information over long distances, including the use of Internet and video-based applications, being delivered in real-time (live) or through store-and-forward (record now, view later). This is far from the truth because telehealth also involves changing the way people think, view, and conduct healthcare around the world. It is a unique global tool, which has the capability to overcome all existing geographical, political, social, linguistic, and cultural divides in the health system.

The application of information and communication technology (ICTs) in the area of health delivery has been high on the agenda of the BDT for a long time. In 1997, with the help of the Portuguese Administration who offered to host the event, the ITU organized the First World Telemedicine Symposium for developing countries. This was the first world forum to discuss and acknowledge the host of benefits that telehealth could bring to society. At that time, there was resistance to change on the part of health practitioners who remained skeptical about the application of information and communication technology in health delivery. Riding on the success of this event of its first kind, the ITU organized the Second World Telemedicine Symposium for Developing Countries that was held in Buenos Aires, Argentina, in 1999. It was at this symposium that the World Health Organization (WHO), and the ITU decided to work together in the future to make telemedicine a success. Since then, the two sister organizations have formed study groups in their respective organizations to work on the issue, have collaborated, and have also conducted pilot projects in partnership with the private sector. Having said all the above, there are a lot of challenges and hurdles that need to be passed before we can make telehealth ubiquitous.

This publication comes at an  opportune time as it is the eve of the historic World Summit on the Information Society (WSIS), scheduled to be held in Geneva, Switzerland in December 2003, and in Tunis, Tunisia in 2005, under ITU's leadership.

The Summit provides a unique opportunity for all key players – world leaders, private sector, and NGOs - to agree on ways of making the information society a reality for the benefit of all and to transform every man and woman into a knowledge worker.

**HAMADOUN I. TOURRÉ**
**Director**
**Telecommunication Development Bureau**
**International Telecommunication Union**

**FOREWORD**

**MIRTA ROSES PERIAGO**

**Director**
**Pan American Health Organization**
**Regional Office of the World Health Organization**

In today's global environment, governments of Latin America and the Caribbean and other key sectors concerned with social welfare are acutely aware of the importance and critical role that health plays in the development process. This awareness has underscored the necessity to improve access to quality healthcare and to reduce the inequality gap present in national health systems. Although significant improvements in the health status in the Americas have been achieved in the past decades, new and complex challenges still confront the Region. Investment in health is therefore central in advancing and sustaining the development process and contributing to the well-being and quality of life of the Region's citizenry.

At the same time we witness that the scenario is becoming more complex and challenging, as result of the increased mobility of citizens, both within and between countries, and the expanding process of regional integration. The new models of health sector organization, characterized by multiple public-private providers and contributors, have made the provision of healthcare services multifaceted and have emphasized the urgent need for mechanisms to facilitate equitable access to services, evidence-base technical information, and access to historical personal health data, be it in urban or rural locations. Likewise, the international dimensions of public health and its close links with the national and local situation demand novel ways to deal with the recording, maintenance, and access to the health data of individuals and population groups. This need was recognized in high-level international meetings -- the Presidential Declaration of the 1998 Summit of the Americas and subsequent international meetings held since then (Florianópolis Declaration by the representatives of Latin American and Caribbean countries; Brasília Communiqué of the Presidents of South America; Rio de Janeiro Declaration of the Intergovernmental Meeting on ICT for Development; Declaration of the Rio Group; the Declaration of Santiago of the Rio Group and the European Union Minister's Meeting) emphasized the critical importance for the countries of the Americas in having a common stake in improving access to and delivery of healthcare through communications and information technology.

During the past decade, the convergence of multiple digital technologies, the increased capacity and speed of modern computers, the ubiquity of telecommunications, and affordable data processing and online access to mass data storage, have propelled the widespread deployment of computerized information applications in service management, logistics of patient and public health administration, direct patient care, and professional education.

Telehealth -- the use of medical information exchanged from one site to another via electronic communications to support healthcare needs, for accessing knowledge by patients or care providers, and for the purpose of improving patient services -- utilizes the power of such information and communications technologies to transfer medical information for diagnosis, therapy, education, and operational management. Telehealth has been shown to provide an affordable mechanism for cost-effective care in a variety of settings. Most of the presently deployed applications are, however, still based on a "hub and spoke" concept using interactive video or store-and-forward technology over telecommunication links for professional exchanges between providers, medical consultations, interpretation of medical images, and second opinion. The information may include medical images, live two-way audio and video, patient medical records, and a variety of output data originating from medical devices.

Although still new, telehealth is nevertheless rapidly changing and recent technological innovations call for a broadening of such conventional thinking regarding the utilization and scope of telehealth applications. Once confined to expensive demonstrations of medical care to patients in remote areas, telehealth is quickly becoming an integral component in the delivery of modern healthcare regardless of geographic or socioeconomic status. New developments in telecommunications, lowered technology cost, and the establishment of public networks and Internet-based systems will influence the growth of health information and communication applications in such a way as to result in profound and revolutionary effects on the delivery of medical care throughout the world. By providing direct links between the general practitioner and major medical centers it can also sustain the education of the physician and provide health professionals with a powerful tool to keep current with new knowledge.

With the dissemination of new technologies, the conventional telehealth "hub and spoke"-based systems are now being linked into broader networks, expanding their reach and effectiveness and rapidly transforming the delivery of healthcare and the cost-effective access to quality healthcare. Recent innovations in the use of computer-driven diagnostic systems, micro-sensors, Web-based services, and interactive medical technology will most probably improve the scope and access to applications even further. Direct patient-provider interactions will increase involving two-way live audio and video visits between patients and health professionals, patient monitoring data from the home to a clinic, or permitting the concurrent access to the full patient medical record from any care point.

It is important to recognize that embracing telehealth is an important mechanism in the quest to address some of the inequities in health. However, we need to underscore the value of telehealth applications as perceived by local and remote providers and patients in meeting their needs. Telehealth applications work most effectively when consideration is given to the environment in which the health system operates. The variety of healthcare models requires a diversity of informatics solutions that must be affordable and take into account a variety of stakeholders. Particularly, many healthcare reform processes which emphasize effectiveness, efficiency, patient safety, and accountability, demand information systems capable of supporting various perspectives and requirements. Five years ago the cost of a typical telehealth installation would have been exorbitant and prohibitive to most public health systems. Today, the cost of hardware has been significantly reduced although it still remains out of the reach of economically-challenged communities.

The critical issues related to the deployment of telehealth applications are not singularly technological in nature but related to the organizational and personnel components of health systems, for the most part precarious in the majority of developing countries. Frequently one finds a dissonance between the expressed desire for change, and the actual incorporation of information technology by the sector due to financial restrictions or difficulties faced in the deployment of technologically complex projects into the public health sector. Other impediments related to the broader adoption are related to high telecommunications tariffs, training of health professionals, existing laws and regulations as well as the attitudes of many involved in the traditional practice of medicine. Many concerns have been raised regarding the sensitive areas of personal data protection, privacy, and the misuse of health data by third parties. Other related issues involve data-related standards, authentication, credentialing and licensure barrier issues, provider reimbursement, physical security of automated systems, data communication security, liability, and those related to the regulation of telecommunications and Internet service providers.

The Pan American Health Organization is pleased to partner with CITEL/OAS and the ITU in launching "Tele-health in the Americas". This publication attempts to answer some of the questions, concerns, and possible solutions in the use of advanced information systems in healthcare services in our Region. Besides an extensive review of the literature, the document reflects the experience of a large number of Latin American and Caribbean professionals and institutions. In keeping with the mandates of the Summits of Presidents and Heads of State and Government, the Pan American Health Organization has emphasized the importance of capacity building, excellence, and initiatives that aim at guaranteeing equitable access to health and the wellness of the people of the Americas, of which this book is an example. I hope this publication will have the widest possible distribution and will act as a catalyst for the improved utilization of telehealth as one of the mechanisms of addressing the

inequities in health and strengthening the implementation of primary health care in the Region of the Americas.


**MIRTA ROSES PERIAGO**
**Director**
**Pan American Health Organization**
**Regional Office of the World Health Organization**

## FOREWORD

**LUIS DI BENEDETTO**

**Chair**
**Latin American Association of Research Centers and Telecommunication Enterprises**

It gives me great satisfaction to introduce this publication, which represents what has been a long history of collaboration between CITEL and Latin American Association of Research Centers and Telecommunication Enterprises (AHCIET) in fields such as personnel training in Latin America and universal service.

This publication is a significant achievement in the field of Telehealth. AHCIET's contributions to this effort are based on its experience over recent years in organizing four telemedicine forums that were widely embraced by all interested parties.

We congratulate CITEL on this initiative, which will benefit all major parties involved. New technologies provide means of exchanging experience and knowledge in the area of health, to the benefit of society as a whole.

The breadth of knowledge, invaluable sources of information, thoughts and ideas presented in this work should prove highly useful to the reader. The publication embraces a range of disciplines, skills, and areas of responsibility. It provides clear, structured, and comprehensive parameters for obtaining thorough knowledge of the latest trends and research now shaping developments in telemedicine.

Again, I wish to congratulate the authors of this significant contribution to progress in the field.

**LUIS DI BENEDETTO**
**Chair**
**Latin American Association**
**of Research Centers and**
**Telecommunication Enterprises**

## CONTENTS

**INTRODUCTION**

The use of Information and Communications Technologies (ICTs) in the health area – based on the development of systems, networks, and communities that carry out telehealth activities and provide added value health services – means that joint efforts must be made by three sectors that do not necessarily share technical terminology, work methods, professional goals, or competitive objectives:

Health care is based on a science that is both exact, empirical, and demonstrative. Its practices requires, in the framework of well-defined rules, that resources are allocated, rather than that results are necessarily attained. Its principal goal is to prevent complications. Where they cannot be avoided them, the objective is to identify the most appropriate solutions.

The telecommunications sector requires high-level industrial engineering resources. Such personnel are required to produce results on a global scale. This challenge implies the achievement of a level of global interoperability; to that end, it has been necessary to reach consensus regarding common standards, and to establish regulations and controls of technical quality and client satisfaction have had to be established.

The priority criteria of the information technology industry are innovation, productivity, access to data and information, and competitiveness. Its central objective accords more priority to combining diversity with principles of cost efficiency than it does to the pursuit of global (telecommunications) interoperability or the prevention-treatment of disease and its potential (health) complications.

These three worlds, with their different language and codes, are complementary, and are essential to the development and implementation of telehealth networks, services, and solutions. Accordingly, there is general need for a minimal degree of awareness of the other sectors and of multidisciplinary integration.

The Book on Telehealth in the Americas seeks to bring these three communities together by including in a single work the contributions made in this area by the different regional and international organizations involved, and by providing a compendium of some of the numerous telehealth experiences in the countries of the region: references, definitions, and proposed standards, guidelines, and practices.

These contributions, through which we consider that telehealth contributes to enhancing quality of life, take a twin-faceted, complementary approach, on the one hand, at the level of communities, whether demarcated as regions, subregions, countries, provinces, states, or localities, or institutional or family groups; and, on the other, at the level of individual health and welfare.

This printed edition of the Book on Telehealth in the Americas is intended as a guide to the unabridged book, available in multimedia format, and as a summary of its contents.

## OBJECTIVES OF THE BOOK ON TELEHEALTH

This chapter sets out the different objectives that led to the work summarized in this book. In the Multimedia Version, it may be found in **CONTENTS/Objectives of the Book on Telehealth.**

In addressing the need to disseminate quantitative data and studies on actual experiences of telemedicine,[1] as the Second Summit of the Americas underscored that the countries were to identify existing and emerging needs through greater use of communications technologies and health surveillance, and the Summit of the Americas of Quebec City, held in 2001, underscored the importance of telemedicine,[2] Permanent Consultative Committee I of CITEL resolved to[3]:

".1. Prepare the Book "Telemedicine in the Americas",

2. Assign to the Working Group on Basic and Universal Telecommunication Services the promotion of the compilation of information, the drafting and editing of the documents under the coordination of the Group's Presidency and the contribution of the Telemedicine Rapporteur Office.

3. Urge CITEL member countries to cooperate with the necessary collection of information.

4. Invite BDT/ ITU to participate jointly with CITEL in the preparation of the Book,

5. Establish contacts with health-related public and private organizations that are able to provide technical and/or financial aid and invite them to cooperate in the drafting and editing of the Book."

With these guidelines, and taking into account the preparatory work for the World Summit on the Information Society,[4] with a view to enhancing its usefulness, the purposes of the Book on Telemedicine in the Americas reflect two sets of larger, mutually complementary, objectives:

- To conduct a survey of the status, pilot experiences, projects under way, and level of development of telemedicine in the different countries of the Americas;

- To study the incorporation of ICTs in the health systems of the countries of the Region.

In the **Multimedia Version**, see: EVENTS/SUMMITS OF THE AMERICAS and EVENTS/WORLD SUMMIT ON THE INFORMATION SOCIETY; and http://www.itu.int/wsis

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[1] See WTDC-98 – identified in the **Plan of Action** of the World Telecommunication Development Conference of La Valetta – http://www.itu.int .
[2] See documentation on the Summits of the Americas in the CD-ROM for this book.
[3] Resolution PCC.I/RES.133 (XV-01)**3**
[4] WSIS – First phase, Geneva, December 2003; second phase, Tunis, 2005.

**The status of telehealth in the Americas**

This first general objective of the Book on Telehealth in the Americas is to gain a sense of the status of telemedicine and telehealth in the Americas region. This effort involves compiling information and conducting a retrospective study in order to establish, in broad terms, the status thereof within the region.

To that end, the following working objectives have been proposed:

- To establish the series of projects benchmarked by the public authorities of the countries of the Americas region, so as to be able to:

  - Distinguish the media within the reach of each project;

  - Identify the activities, areas, and specialties of the value added services provided from remote locations;

  - Seek to establish the different sources of funding.

- To describe briefly the status of health in the different countries of the region, so as to be able to:

  - Provide a means of comparison among them; and

  - Gain an awareness of the investment efforts made by each in the health sector.

- In addition, to gain an idea of investment in the telecommunication sector in order to:

  - Establish a means of comparison with investment in the health sector; and

  - Visualize the telecommunication infrastructures making it possible or that would make it possible to implement telemedicine and/or telehealth projects.

- To establish the state of the art of ICTs utilized in the health area in the countries of the region.

**Incorporation of information and communications technologies in health systems in the Americas**

There are two aspects to the second general objective of the Book on Telehealth in the Americas:

- It seeks, on the one hand, to visualize and study how the different countries and their institutions – whether public, civil society, academic, or private sector – are preparing and have prepared for the use of ICTs in the health sector, in particular, for telemedicine activities and services.

- It includes the series of efforts – publications, symposiums, meetings, and seminars on telemedicine and telehealth – made by international telecommunication organizations and private sector health organizations with competences in the Americas region, in order to explore the resolutions, recommendations, and activities pertaining to ways ICTs have been and/or are to be incorporated in health systems, with a view to executing projects, carrying out activities, and providing telemedicine and telehealth services.

This general objective involves a first, preliminary effort to gain an awareness of some of the practices that have generated positive results, so as to point the way for subsequent works on *best practices in telemedicine*.

This objective is in keeping with the recommendations of both the Summits of the Americas and the objectives of the World Summit on the Information Society (WSIS).

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In the **Multimedia version**, see: EVENTS/SUMMITS OF THE AMERICAS and EVENTS/WORLD SUMMIT ON THE INFORMATION SOCIETY; and http://www.itu.int/wsis.

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**Work method used in preparing the Book on Telehealth**

The work method used was to make both a retrospective study of experiences of and efforts made by the different countries of the region, and to provide a compilation of meetings, seminars, symposia, and conferences related to telehealth and to information society issues.

Accordingly, the series of steps taken and goals pursued by Permanent Consultative Committee I of CITEL (PCC.I) and this book's work team to attain to attain the objectives described in this chapter were:

- To study the resolutions and recommendations of the ITU, in particular, those emanating from the World Telecommunication Development Conferences of 1998 (La Valetta) and 2002 (Istanbul) pertaining to the work of PCC.I, in particular, of its Working Group on Basic and Universal Telecommunications Services, on the importance of telemedicine to the Americas region.

- To consider the resolution of PCC.I of CITEL instructing CITEL to prepare the Book on Telemedicine in the Americas.

- To invite the ITU to participate actively in preparing and editing the Book and to contract the Principal Expert. To hire CITEL experts and conclude agreements with the participating institutions.

- To prepare the different surveys proposed to PCC.I and for the member states to approve them.

- Distance research 1: Specific surveys

  o To transmit surveys 1 and 2 to the Administrations of the Member States of the region (CITEL);

  o To retransmit surveys 1 and 2 (CITEL and ITU experts); and

  o To transmit surveys 3 and 4 to the telecommunications companies of the Americas region (AHCIET).

- Distance research 2:

  o To survey the parties responsible for the different projects;

  o To survey ICT programs and/or projects, not necessarily related to health (local leaders); and

  o To search the Internet for related sites. To survey medical journals.

- To compile the publications of CITEL, PAHO, the ITU, and AHCIET

- To conduct an on-site study. The different experts (CITEL and ITU) have conducted a limited number of studies in different countries of the region.

- To analyze/discuss data. Group work/initial conclusions

- To disseminate information (complete book, CD-ROM, and paper summary) and systematize it. To incorporate multimedia interfaces for enhanced comprehension, and to work on user friendly and user useful aspects

- To forward the preliminary draft and draft to PCC.I of CITEL

- To forward the final preliminary draft to PAHO and to hold a working meeting with Principal Expert

- To make corrections (PCC.I and Administrations)

- To prepare the final version

**Definitions of the uses and applications of Information and Communications Technologies in the health area**

The most widely used terms are defined below, along with some of the most recent neologisms emanating from the culture of the information society (e-culture). The **CD-ROM** contains: A brief history; an interactive interface for greater comprehension of the different components of telehealth; the interrelationship between the different e-applications in health care, and the main objectives thereof.

**Definition of telehealth – health telematics – health applications of ICTs**

Health telematics is the delivery of health services, where distance is a critical factor, by health care professionals using information and communications technologies (ICTs) for the exchange of valid information data for diagnosis, treatment, and prevention of disease and injuries, and for the continuing education of health care providers, as well as research and evaluation, all in the interests of advancing the health of individuals and their communities. [i]

In the **Multimedia Version**, see: DEFINITIONS to visualize the interactive definitions scheme.

Four major areas of application can thus be distinguished:

1. **Telemedicine**

2. **Telehealth**

3. **Research networks and tele epidemiology**

4. **Management and health management networks**

The research area (3) is often associated with evaluation activities.

The most widely used term is currently, **telehealth,** rather than health telematics, which we define interchangeably.

### Telemedicine

There is now consensus worldwide that the term "telemedicine" refers to the clinical aspect of telehealth or health telematics (prevention – diagnosis – treatment – follow-up). It involves cooperative medical practice among health professionals, at least one of whom is a physician, from a remote location, in real or deferred time, through the use of ICTs.

### E-medicine and e-health

E-health is a new item among a series of e-culture terms. From the etymological standpoint, it means electronic health. According to purists, "e-health" applies only to health activities, applications, and services not requiring human involvement. Synonyms are *on-line health*, *electronic health*, and *Web health.*

**Classification of Definitions**

The **Multimedia Version** contains a compendium of the most frequently used terms in telemedicine and telehealth, the most common of which are:

**Teleconsultation**

Consultation of competent health personnel from a remote location through the use of ICT systems. Involves concepts of comprehensive medical care, including clinical diagnosis, supplementary examinations, treatment, etc.

**Telediagnosis**

Diagnosis resulting from consultation, to be used for patients unable to attend face-to-face consultations.

**Second opinion**

The opinion of an expert offered with a view to providing greater certainty regarding a tentative diagnosis, in general accompanied by advice or suggestions regarding treatment.

**Telecare**

Care of patients in low-complexity health structures, outpatient units, or at home (in the latter case, this is distinguished from "home care"), attended by health professionals from a remote location through the use of ICT applications

The communications media are, in general, network or satellite telephony, although, more recently, they have included wireless telephony (see m-medicine), dedicated lines, cable, and digital telephone lines. In the future, it is anticipated that such media will include digital television.

Some of the data transmitted may directly or indirectly activate an alarm.

**Tele-education**

There are many applications of distance education, in real or deferred time. Tele-education makes it possible to carry out from a remote location, *inter alia*:

- **Prevention activities**, in three of its components
    - **Primary prevention**: Multimedia preventable disease education, information, and prevention campaigns, such as, anti-tobacco campaigns to prevent cancer, cardiovascular disease, etc;
    - **Secondary prevention**: Early detection of disease or pre-pathological conditions, such as detection of cervical dysplasia, thereby preventing its degeneration into cervical cancer. This application is one of the areas of interface between telemedicine and distance education[5];
    - **Tertiary prevention**: Follow-up and action to correct the pathogenic habits of chronic or post-critical patients, in order to downgrade their pathological status and reduce the incidence of complications, and relapses, generally with a view to enhancing quality of life. An example would be monitoring a patient after a heart attack, thereby reducing cardio-pathogenic factors.

- **Curriculum training**
    - Distance training;
    - Professional development; and
    - Evaluation and opportunity for feedback between teacher and students.

- **Medical training and professional development**

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[5] See definitions scheme in the CD-ROM.

o Accreditation and recertification

**Telemanagement**

Traditionally applied to health management systems in order to administer processes such as handling of appointments, invoicing, maintaining inventory, and strategic planning.

Interfacing with other telemedicine applications enables the different structures from which they may be drawn to triage patients in real time. This application is highly useful in emergency management, crisis management, and disaster management.

**Teletherapy**

Patients may be followed up and treated through the use of videoconferencing systems for the following specialties (among others):

- Telepsychiatry
- Telephysiotherapy
- Teleoncology
- Teleprescription

Invasive therapies, such as minor surgery (see telesurgery), may be carried out by means of robotics from a remote location. Anesthesiologists can assist specialized senior nurses from a remote location through the use of biometric monitoring (see telemetry).

**Teleradiology**

Teleradiology is one of the most widely utilized specializations in telemedicine as digital/computer imaging is among the practices used by this specialty. Thus, the only component added is operation from a remote location. In addition, some modalities are by nature digital, which facilitates the data capturing process.

Additional terminological definitions may be found in the Multimedia Version.

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In the **Multimedia Version,** see: **CONTENTS/PRELIMINARY STUDY/TERMINOLOGICAL CLARIFICATION of DEFINITIONS**/DEFINITIONS for a **more complete** list of terms.

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**Factors and parameters used to evaluate telemedicine and telehealth projects and programs**

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This chapter sets out different elements to be used to measure and evaluate telemedicine activities, health-related e-services, and telemedicine and telehealth projects and programs.

The **Multimedia Version** includes elements of evaluation, in particular, Martinez, A., Rodrigues, R., et al.: *Bases Metodológicas para Evaluar la Viabilidad y el Impacto de Proyectos de Telemedicina* [Methodological Bases to Evaluate the Viability and Impact of Telemedicine Projects]*,* published by PAHO.

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Telemedicine and telehealth are at a relatively recent stage of implementation.[ii] Insufficient studies are available to establish rigorously their effectiveness, usefulness, and efficiency in every sphere of application. The ICT **critical user mass** in the health area has not yet been reached, in particular, among health professionals in developing countries.

In such countries, existing projects have not yet generated a statistically significant number of cases treated through the use of telemedicine and telehealth applications as compared with the number of cases treated using traditional methods.

In addition, methods utilized, whether chosen at random or planned, usually vary widely from project to project, so that comparative studies are unreliable and, in general, results cannot be replicated.

Evaluations are not usually incorporated from the outset into project processes. As is aptly noted by the authors of ***Bases Metodológicas para Evaluar la Viabilidad y el Impacto de Proyectos de Telemedicina*** [Methodological Bases to Evaluate the Viability and Impact of Telemedicine Projects], published in 2000 by PAHO/WHO, evaluation must be seen as a tool to be used in measuring partial and final results, and providing continuous feedback for the implementation process.

Adjustments made to projects as a result of partial evaluations translate into greater effectiveness, more visible impact, and enhanced cost-benefit ratios. Evaluation must be taken into account in the total program or project budget, and seen as a **key** and **intrinsic element** thereof.

**Factors and parameters for evaluation prior to project launch**

A widely accepted concept is the **network preparedness** or **readiness** of a community, whether a country, province, state, locality, or institution. The objective of this prior measurement concept is to establish not only the probability of success of an ICT-related project, but also the points at which particular effort prior to project launch is recommended.

**Project evaluation methods**

If evaluation is included from the project planning phase, to the alternatives available through retrospective analysis may be added those provided through the use of different prospective methods. This enlarges the array of possible measurements and enables that most suited to each situation to be identified.

At the time of selecting evaluation and measurement parameters and factors, both **quantitative** and **qualitative** methods must be taken into consideration. Qualitative methods are generally more appropriate when evaluating the impact of telemedicine and telehealth on the health system per se, and on cooperative relations among professionals, institutions, and communities.

Relations among communities may be relations among countries, in particular, among neighboring countries, which would require specific evaluation of transnational aspects, such as trade and sales of health goods and services, or impact on jurisprudential and professional responsibility criteria. This may also apply within individual countries if they have decentralized federal health systems, where each state or province has its own specific framework, as is the case of Canada, United States, Mexico, Brazil, and Argentina.

Prior qualitative studies also create an opportunity for prior project evaluation, smoothing the way for the said intermediate and final quantitative evaluations.

Different methodological alternatives are available for use in quantitative evaluation:

**Observational** studies: the researcher is limited to observing and obtaining data on a group, and may not intervene, but only observe what occurred among individuals exposed or not exposed to a particular technological intervention. These are, in general, retrospective studies.

**Experimental** or **quasi-experimental** studies: As the project progresses, a specific group (benefited by telehealth applications) and a control group are studied prospectively and in parallel, in different alternative scenarios. If sample sizes are sufficiently large and groups are adequately created, causal relations may be established with greater certainty.

In research conducted on the basis of **surveys**, it is important to follow a series of steps, which enables the theoretical framework to be defined, working hypotheses to be postulated, questionnaire or questionnaires prepared, data codified, sample or samples selected, and data obtained, processed, and studied.

These methods may be supplemented by **quantitative evaluation of diagnostic tests;** and the use of **mathematical simulation** models and **predictive** mathematical and/or computer **models**.

**Planning evaluations**

Ideally, evaluation must be carried out in **three stages**: Prior to project launch, establishing the initial status (or time 0) of the parameters to be measured; during project execution; and after project completion, in particular, in the case of research, demonstration, or pilot projects.

In the project organizational context, the concept of **continuous evaluation** allows for greater flexibility in making adjustments in cases of social, political, and/or economic changes.

One lower cost alternative is regular planning of evaluation times, whether at specific intervals or upon completion of specific tasks and activities - for which it is useful to define the "deliverables" in advance - or some combination of the aforementioned methods. In this case, delivery of the products is in itself an evaluation parameter.

It is advisable to describe evaluation methods, and for the evaluation implementation plan to be included in the document.

**Economic evaluation factors**

Economic evaluation must from the outset include a categorization of costs: direct, indirect, and intangible; that, is, the costs related to the project itself, and the different costs of the health practices to which the project pertains.

In the health area, it is difficult to evaluate indirect costs, as economic impact is long term and, therefore, under evaluated. One example is the series of indirect costs of the disability through inadequate care of an injury of an individual at prime working age or, even more to the point, the costs associated with difficult childbirth, the baby incurring major psycho-motor disability whose consequences last throughout the child's life.

It is important to note that economic evaluation compares two alternative courses of action (with or without the use of ICT applications). It is therefore simpler to compare the costs and tangible and intangible impact of each.[iii]

**Evaluation of the impact of telemedicine and telehealth projects**

The essential components of an impact evaluation are:

- Impact on the clinical process
- Impact on patient health
- Impact on access (equity)
- Economic impact
- Impact on acceptance

The most important elements of a project **feasibility evaluation** are:

- The political and legal context for the practice of telemedicine
- Technical feasibility
- Institutional feasibility
- Economic feasibility
- "Cultural" feasibility

A useful way to obtain statistically accurate results in evaluating telemedicine projects is to increase sample size. This is possible owing to the existence of multicentric projects.

Unification of evaluation standards and criteria and methods, and verification of results are among the soundest strategies for obtaining useful results.

**ICTs and health in the third millennium**

The **Multimedia Version** contains reference documents on the evolution in parallel of health over the last 50 years and of telehealth in the history of medicine.

It also contains the **ITU** and **AHCIET** symposiums on telemedicine, which have contributed to the dissemination of telehealth in the region.

At the opening of the third millennium, the use of information and communications technologies foretells of potential further and more harmonious development. In the health area, such development may target either individual welfare or the health of communities.

Although the most important efforts in telemedicine emerged in the mid-20th century in parallel to the joint development of information and communications technologies, different authors consider that telemedicine and telemedicine activities originated in the Middle Ages.

Initially, the advancement of telemedicine depended on possibilities for **communication** and the willingness of physicians to cooperate with one another regardless of distance. This is one of the primary elements of the "*Human Factor,*" one of the factors that determine the success or failure of telemedicine projects.[6]

Cooperation among health professionals and the exchange of information among doctors and patients improved as communications technologies were incorporated: in the late 19th century, **telegraphy** was used for the transmission of clinical data. A 1929 description exists,[iii] as part of a business service concept, of how to send dental X-rays by telegraphy.

For further detail, in the **Multimedia Version,** see: **DEFINITIONS/EVOLUTION OF TERMS IN HISTORY/MODERN TELEMEDICINE.**

Since the **telephone** first appeared, voice transmission has been used to send clinical histories and interpretations of supplementary examinations: the first telephone communication recorded by Alexander Graham Bell was a call for medical assistance[iv]; and, in 1910, the telephone was already being used as an electronic stethoscope to amplify sound.[v]

In parallel, in the late 19th century, transmission of medical data by **radio** began. After World War I, medical care services were expanded to include sailors on the high seas.[vi] This was extended to include airline passengers, for whom **radio frequencies** were also used to obtain professional medical advice.

**Television** brought about a substantial improvement in the quality of information transmitted, and added to it, along with the added value of moving images, a concept of real time closer to that of today. The first experiences were implemented via closed circuit television (CCTV). In 1950, in Nebraska, United States of America, at the Nebraska Psychiatric Institute, using bi-directional connections, transmissions were made via closed circuit television for consultations between specialists and clinical physicians.[vii] In Latin America, on August 1-5, 1950, for pedagogical purposes of exchange among specialists, at the Seventh International Congress on surgery, a series of surgeries were transmitted live by CCTV each day of the congress between a Buenos Aires (Argentina) hospital and the Faculty of Medicine of the University of Buenos Aires. [viii,7]

In parallel with these events, Mr. Albert Jutras launched a **teleradiology** program in Montreal, Canada, transmitted as video via cable.

The need for **medical education** supported by moving images has been a reality since the Middle Ages as, about the 15th century, in Italian schools, and in other countries, notably, Montpellier, Paris, and Oxford, anatomical dissections began to be performed.[ix] **Film-makers**

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[6] At the 2003 Annual Congress of the American Telemedicine Association (ATA) (http://www.ata.org ), over 10 papers, presentations, and posters were presented on the topic "The Human Factor."
[7] See the CD-ROM of the Book on Telehealth in the Americas.

have, since the 1890s, contributed different documentaries, showing eminent experts giving reference presentations.[8]

In the **Multimedia Version**, see: ARGENTINA/BACKGROUND/SURGERY DR. POSADAS

During the 1960s, telemedicine entered into modern phase. The role of the National Aeronautics and Space Administration (NASA) took on special significance through the monitoring of astronauts in space through **biometrics**.

In 1967, a two-way circuit transmitting sound and video by **microwave??? Sound and video microwave circuit** enabled doctors at Massachusetts General Hospital (Boston, MA) to provide health services to patients at Logan International Airport, 2.7 miles away.[x]

In 1969, the term **telediagnosis**[xi] appeared in the literature for the first time, along with the concept of health information **networks.**[xii]

At the same time, **information technologies** had taken a giant step forward. In 1947, William Shockley, John Bardeen, and Walter Brattain, of Bell Laboratories, manufactured the first working prototype of the **transistor**[9]. In 1958, integrated circuits, for which Robert Noyce is credited, were invented and patented. In 1964, IBM (International Business Machines) introduced its System/360 computer series on the market, manufactured with **digital integrated circuits** only**,** thereby reducing computer size from office dimensions to the size of an electrical appliance of the period, such as a washing machine. In 1971, a company belonging to the same Robert Noyce, Fairchild Semiconductors, independently developed, for Intel, the 4004 microprocessor.

For further detail, see **Multimedia Version**: DEFINITIONS/EVOLUTION OF TERMS IN HISTORY/MODERN TELEMEDICINE II; EVENTS/ITU AND AHCIET SIMPOSIUMS AND SEMINAR; PUBLICATIONS

Since that time, from a purely technological standpoint, telemedicine would not evolve solely in parallel with **telecommunications,** but also with **computer and information technologies,** which provide the possibility of integrating, storing, processing, and transmitting different health data using a common language.

Today, the interdependence of the two technologies is so essential to the development of society and, in particular, of telemedicine and telehealth, that we generally speak of "**Information and Communications Technologies**" **(ICTs)** as a single term.

In 1971, the first articles were published on satellite transmission, which discussed the **legal aspects** of **teleconferences,**[xiii] as well as their **educational aspects.**[xiv]

Although the term **telemedicine** may be found in specialized literature as of 1972,[xv] the part played by Mr. Bashshur and his collaborators[xvi] in its implementation and dissemination, based on a conference-workshop held in 1973, in Ann Arbor, Michigan, was highly important, as they addressed a wide array of topics related to this new discipline, and underscored issues that remain current today.

From then until the beginning of the following decade, the terms and topics studied related to telemedicine: In 1972, the first paper on rural telemedicine was published.[xvii] The following year, the first article on networks for indigenous communities was published.[xviii] In 1974, the first evaluation was published on telediagnosis of 1000 patients[xix], and a paper was published

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[8] A 1897-98 documentary on the surgery of Sr. Alejandro Posadas, available through the generosity of Juan José Montes de Oca Central Library of the Faculty of Medicine, University of Buenos Aires (UBA).

[9] William Shockley, John Bardeen, and Walter Brattain received the 1956 Nobel Prize for Physics for their work on transistors.

on home care.[xx] In 1975, publications on midwifery-related telemedicine were available[xxi] and, in 1978, on pediatrics-related telemedicine.[xxii] Thus, the telemedicine concept was expanded to include e-medicine and telehealth.

The part played by images is key for numerous medical specialties.  In consequence, telehealth development was not possible until genuine alternatives for storing, processing, and transmitting digital images were available.  In the 1990s, the technological limitations were overcome in connection with memory capacity and bandwidth for transmitting large files, *inter alia,* owing to increasingly large memory supports, increasingly efficient lossless logarithmic compression algorithms, and the dissemination of telecommunication platforms and protocols, which increased accessible bandwidth.

In parallel, progress was made in standards applicable to health in its different aspects, with static image standards and formats (DICOM 3.x for medical images, which includes, *inter alia*, the clinical data necessary for diagnostic interpretation) and moving images (efforts continue to reach consensus on a dynamic DICOM type standard), for data (UN/EDIFCAT (ISO 9735), which includes specific standards for medicine; the HL-7 protocol for medical data collection, storage, and processing systems; for audio (if the ITU-T H.320 transmission standard is applied, the audio encoding scheme recommended for medicine is usually G.711, G.722, or G.728); for audio/video conferences (it is, not exclusively for telehealth: H.320, H.323, and H.324); for synchronous multimedia systems (T.120 and compatibles), etc. All these standards have facilitated major progress in telemedicine and telehealth.

> To consult additional sources, in the **Multimedia Version**, see: EVENTS/SEMINAR ON STANDARDIZATION IN E-HEALTH

However, as of late 2002, there were no specific published standards on telehealth.  A 2002 ISO/IEC work has been disseminated by the WHO and was being published at the time this report was being prepared.  At the same time, ITU-T and ITU-D (BDT/ITU) organized a seminar on e-health standards, held in May 2003.

> In the **Multimedia Version,** see: EVENTS/SEMINAR ON STANDARDIZATION IN E-HEALTH

In addition, in the mid-1990s, professionals working with ICT health applications began to organize and the first international meetings with a view to building consensus were held.  To be noted in particular are the efforts of the World Health Organization which, in 1997, defined telemedicine as part of **health telematics,** [10] to which we will refer in this book.

In the late 1990s, there was a certain sense of enthusiasm in the telecommunications sector in connection with the countless ICT-related applications.  Investment has been made on numerous occasions in our region in pilot activities and projects, as there was conviction that the supply of infrastructure would suffice to generate demand for value added services.  In different meetings, this has been described as the "**solution in search of a need"** syndrome.

It took until the end of the second millennium to reach consensus on initial needs with a view to developing appropriate technological solutions.  A first consensus was reached recently at the Second World Telemedicine Symposium for Developing Countries, organized by the ITU in Buenos Aires.

> In the **Multimedia Version**, see: EVENTS/SECOND WORLD TELEMEDICINE SYMPOSIUM FOR DEVELOPING COUNTRIES

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[10] World Health Organization (WHO) in "A Health Telematics Policy in Support of WHO's *Health-For-All Strategy For Global Health Development*" (Geneva, December 1997).  See corresponding chapter in this book.

> The **Multimedia Version** contains more detailed information, accessible by **map browsing**, country -by -country, starting at "Home."

## NORTH AMERICA

The three countries of North America have, at different levels, pioneered the use of ICT health applications:

**United States** carried out the first experiences in applications of communications technology for the transmission of vital health data.

In the early 1960s, NASA of the United States launched 60 **biotelemetrics[xxiii]** initiatives.  This discipline involves transmitting physiological data, such as electrocardiograms (ECG), heart rates, and body temperature, from a remote site to a site with the capability to interpret such data.  This system addressed a need in cases such as astronauts in earth orbit.  The astronauts, who were subjected to extreme physical conditions, were connected to medical equipment in the Johnson Space Center.  By the end of the decade, biotelemetric projects not related to space were already under way.[xxiv]

Different pilot projects have made possible cutting-edge technological development, initially through the use of much more human ingenuity that capability to mobilize resources.  A clear example is health telematics solutions for penitentiaries, which make it possible to monitor inmates more closely, reduce costs, and resolve the problem of specialized workers who do not wish to travel.

The United States was also the first country to establish a national telemedicine association, the American Telemedicine Association (A TA).  Subsequently, the Canadian Telehealth Society was established in Canada.  This association brings its members together at different annual meetings, and its annual congresses are among those with the largest participation.

At the same time, in **Canada**, beginning in the 1960s, pilot experiences were conducted by pioneering radiologists and surgeons of different provinces.[11]

Canada has made major efforts as a society to seek good practice models and protocols for ICT applications, subsidized by the federal government, with a view to facilitating services and provide citizens greater access in the health area.

In 1997, the **Federal Government** launched a national strategy, in collaboration with the provinces, with a view to creating the Canadian Health Infostructure, which includes telehealth strategies. An initial investment of $50 million was made to establish a common fund with the provinces.  The infostructure includes:

- The launch of three initiatives:
    - Healthnet Canada
    - The National Health Surveillance Infostructure
    - The First Nations Health Information System
- The establishment of the Advisory Council on Health Infostructure (ACHI);
- The establishment of an Infostructure support program

In 1999, $366 million was added for the development of ICTs in health, with a view to ensuring that health services respond more rapidly to the needs of Canadians and to enhance health status.

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[11] Mr. Friendel, a Saskatoon neurosurgeon, and Mr. Jutras, a Montreal radiologist, among others.

In late 2000, an additional federal investment fund of $500 million was established for cooperation between the federal government, provincial governments, and the private sector for standards and compatibility studies on telecommunication technologies for Canada as a whole.

**The Canada Health Infostructure Partnership Program (CHIPP**), which contributed $80 million to the fund, made possible co-funding of over 180 innovative health ICT projects (in telemedicine, home telecare, and implementation of digital clinical histories).

In the **Multimedia Version**, see: CANADA/DESCRIPTION and CANADA/SUMMARY for further information on the **Health Transition Funds (HTF**); the **Rural and Remote Health Innovation Initiative (RRHI**); and the report [12] on the **First Nations Health Information System**; etc.

In addition, Canada participates in the **Arctic Council Telemedicine Project (ACTP)**, which seeks to share information on best practices and account for failures of different telemedicine projects in the Council countries.

In 2001, as a contribution to the Third Summit of the Americas, Canada donated Can$ 20 million to create the Institute for Connectivity in the Americas, and was one of the first countries of the region to make effective its contribution to the Agenda for Connectivity.

In the **Multimedia Version**, see: EVENTS/SUMMIT OF THE AMERICAS, EVENTS/SUMMIT OF THE AMERICAS/PLAN OF ACTION OF THE ICA and PUBLICATIONS/AGENDA FOR CONNECTIVITY

For its part, **Mexico** was one of the first Spanish-speaking countries of the region to begin telemedicine activities. The national government has been directly involved in the development of work frameworks, promoting telemedicine and telehealth, and developing linking projects through two public sector programs.

In 1995, the pilot phase of the **National Telehealth Program** began, under the Institute for Government Employee Safety and Social Services (ISSSTE), utilizing a portion of the Mexican telecommunications satellite communications capacity that is allocated to public education and health. The following states have participated actively: Baja California Sur, Baja California, Chiapas, Chihuahua, Guerrero, Durango, Guanajuato, Jalisco, Michoacán, Nuevo Leon, Oaxaca, Sonora, Sinaloa, Tabasco, Tampico, Veracruz, Yucatan, and the Federal District.

The part played by local government was a key to the success of the National Telehealth Program. This was subsequently reflected in the position accorded local government within the E-Mexico Program.

At the beginning of President Fox's term of office, a democratic consultation of the citizenry was conducted, which revealed "the conviction regarding and interest, on the part of citizens, groups, organizations, and areas of different types, in the potential of information technologies and telecommunications to improve health services provided to the public, in particular, to marginal and vulnerable groups."[13]

These results led the Mexican government to take a more systemic approach to the use of ICTs by Mexican society, with the creation of the "**e-Mexico Program.**"[14] Under this program, all health-related issues are the province of the **E-Health Action Program**, begun with a new pilot phase[15] that is making it possible to incorporate new communications technologies, additional information technology applications, in particular, IP-based applications, and new services for the community and sector professionals, over a wider geographic area.

The President of the Republic assigned coordination of the project to the Secretariat of Communications and Transportation (SCT), for execution by the Secretariat of Health (SSA) in

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[12] Working towards Defining the Strategic Direction for Telehealth in First Nations and Inuit Communities.

[13] Publication of the e-Mexico Program, 2003.

[14] http://www.e-mexico.gob.mx/wb2/ .

[15] E-Health Pilot Program – April-December 2003.

a demonstration of operational capability cutting across the different public health areas. Also participating, in addition to the Secretariat of Health, are the Mexican Social Security Institute, the Institute for Government Employee Safety and Social Services, Petróleos Mexicanos, the Secretariat of Defense, and private sector institutions and organizations, in coordination with the National E-Mexico System.

Thus, the purpose of the *E-Health Action Program* is to contribute to enhancing public health and to expand service coverage, assigning priority to inhabitants of the most marginalized areas through a telematics system of high social content; to make available to the public, via the Internet, health information contributing to human and individual development, and development of society as a whole; and to provide support for the education and professional development of health personnel.

In parallel, opening the E-Health portal seeks to keep the general public informed regarding health promotion activities and accident prevention, and to carry out government and administrative procedures in the health area.

Through telemedicine and the E-health portal, it is sought to disseminate health policy, the content of health sector action programs, and campaigns on topics for dissemination that are institutional priorities, and to establish a system for health service administration accountability and transparency.

> In the **Multimedia Version**, see: MEXICO/DESCRIPTION for additional information, in particular, on the strategic activities of the E-Health Action Program Mexico; and MEXICO/COUNTRY PROJECTS and PUBLICATIONS/MEXICO: DISASTER PREVENTION GUIDE and PUBLICATIONS/THE RE EVOLUTION OF THE PUBLIC SECTOR IN MEXICO

At the level of the **legal framework**, all three countries of the region's north have health organizations based on a decentralized federal system.

In **Canada**, the federal government is involved in regulating, at all levels, the use of ICTs, in particular, in terms of the security of transactions, copyright, intellectual property, and provisions of all types, such as those pertaining to:

- Professional responsibility, in particular, for medical practice carried out in real time, such as telesurgery and attendance of surgery from a remote location.

- Jurisprudence, in particular to determine, in cases of medical practice involving institutions and/or professionals of different provinces, which province's legal framework will prevail.

In respect of legislative and regulatory topics pertaining to the use of ICTs in the health area, Mexico has defined a legal framework. More specifically, provisions have been established on the methods, rights, and obligations in professional practice, the responsibilities of professionals in telemedicine, and protection of data, specifically when transmitted over ICT networks or via ICT applications.

**Mexico** is the only country of the region that has issued regulations on transnational medical cooperation through the use of ICTs. These regulations provided, by mid-2003, that only activities involving second medical opinions and continuing medical education could be carried out with foreign professional teams.

The Telemedicine Report to Congress, prepared in 1997 by a multidisciplinary committee of experts, contains a series of recommendations on legislative measures needed for the use of ICTs in the health area.

In addition, in its annual report, the National Telecommunications and Information Administration (NTIA) reviews the different elements to be taken into account, no longer solely at the health level, but in all sectors of society.

Universities are the institutions that promote most telemedicine projects and networks throughout the subregion. That function is traditionally carried out by university hospital research centers.

Such centers are also the preferred site for all types of testing, as they bring together a critical mass of cases/patients and highly specialized human resources with expertise in scientific research, evaluation, and statistical methods.

In general, e-applications reinforce traditional activities, such as:

- Inter-institutional cooperative ties between faculties and their subordinate hospital centers;

- Inter-institutional cooperative ties between the reference hospitals and their subordinate outlying hospital centers;

- Inter-institutional complementarity in connection with medical examinations and for highly specialized physicians. Such complementarity may develop within a city or a university campus.

Different institutions offer courses, mostly undergraduate, graduate, and professional development, on a distance education basis, through the systematic use of IP-based applications.

In general, ICTs have not yet been incorporated in curricula, in particular, in degree studies, as introduction to information technology is a high school and/or elementary school subject.

In Canada, among the faculties of medicine that have moved forward with telehealth is the University of Calgary. In Mexico, Anahuac University is conducting an ambitious program in keeping with the PAHO proposals in this area.

In the **Multimedia Version,** see the descriptions of the three countries for further details on academic functions.

The level of acceptance of the use of ICT applications by professionals in Canada is among the highest in the Hemisphere. The use of ICTs is now part of daily life among more professionals than those who resist technological change. The Canadian Telehealth Society (CST) is a demonstration of the level of dissemination among and acceptance by professionals. The Society has the support of the federal government, and a growing number of members. It was established over five years ago, and organizes and annual congress, held in October or November each year.

**CARIBBEAN COMMUNITY (CARICOM)**

### INTRODUCTION – A Caribbean perspective

The Caribbean boasts a rich, diverse set of cultures of mostly small island states. Suriname and Guyana, on the shoulder of South America and Belize in Central America are the geographic exceptions. Within the myriad of populations speaking English, French, Spanish, Dutch and various creole languages, are economies and communities that reflect the very best and worst of developing countries.

Haiti, which shares the island of Hispaniola with the Dominican Republic, has been described as the poorest nation in the western hemisphere. It had a Human Development Index rank of 146 which put it squarely in the Low human development category, which is the group that has the lowest Index in terms of life expectancy at birth, adult literacy, Per Capita GDP (Gross Domestic Product) and other development factors (Human Development Report 2002).

Of the 26 countries surveyed on progress towards adapting telemedicine as part of their official health policies only five countries, Antigua and Barbuda, The Bahamas, Barbados, St. Kitts and Nevis and Trinidad and Tobago, fell into the High human development category of the United Nations Development Program report.

And apart from the occasional pilot project there were no firm indications pointing to a clear policy of Information and Communication Technology (ICT) being adapted to deliver health services.

While, not all countries share Haiti's social challenges, in all can be found various forms of poverty and social concern can be found.

Addressing social needs, including a regional focus on poverty alleviation, while implementing programs to deal with diverse, pressing issues such as putting a hold on HIV/AIDS and providing more opportunities for women and the youth are of paramount importance in development agendas. While health and education standards are quite diverse, so is also access to basic telephony.

In some communities across the region access to electricity, like good health care, and basic telephone service, are limited.

A major challenge has to do with the lack of financing support these programs.

But far too often, as well, financing is used inefficiently and communities are not involved or empowered into these various programs. Many projects also fall short of being comprehensive in addressing social concerns.

One of several common strands that the region of 10 million plus citizens share is a need to provide significantly higher standards of medical care to its communities.

The provision of health services, like education, is a stated priority of most governments but few can supply a definitive strategy on how telecommunications is associated with health services to improve substantially the health of citizens.

Telemedicine, which has a different definition from country to country, therefore represents virgin ground in terms of a clearly enunciated policy of Government.

Telemedicine involves the utilization of communications technology to overcome constraints of distance and available medical expertise to deliver medical service in a more timely and efficient manner. Such services can be provided over a leased landline or using satellite technology to transmit, for example, the image of an X-ray of an injury or a disease that requires surgery.

Competition in telecommunications has been slow in coming to the Caribbean. Even in some countries where full liberalization exists the perceived benefits of competition, including lower and more affordable costs to the society, are yet to be translated to the point that telemedicine is affordable.

In places such as Puerto Rico, the U.S. Virgin Islands and more recently Jamaica, liberalization has led to more people having access to a cellular phone, but not necessarily, to better health services.

As the digital divide expands between low income and upper income, and between rural and residential communities, the so-called free trade and trade liberalization have left countries that still depend on agricultural produce for hard currency facing hard economic times. When translated, many countries have a reduced capacity to finance social development.

One of the challenges facing the region is in the area of language needs. Albeit of an educational nature. Information from various sources, Information including the media, needs to be disseminated in ways that citizens of Caribbean countries, French, Dutch and Spanish-speaking, as well as English and Creole-speaking, will benefit. There is a need for increased exchange of, for example, medical knowledge and material as well as modes of information sharing, such as Internet forums, to allow citizens to participate, irregardless of their national language.

### *Caribbean health priorities*

Among the major health concerns facing the Caribbean are; HIV/AIDS, cardiovascular disease, with diabetes (a major contributor to heart disease), cancer and mental illness. The use of illicit drugs is another national concern.

The Caribbean has the second highest incidence of infection in the world, behind sub-Saharan Africa. PAHO estimates that there are about half a million HIV-infected persons in the Caribbean with an estimated 25 per cent of this number in the Caribbean Community (CARICOM).

Caribbean countries have placed high priority on founding programs aimed at reducing or eliminating HIV/AIDS. Diabetes, with its impact on mortality rates, also carries high costs for drugs and surgery to remove limbs.

While some countries have had to increase their budgets to tackle HIV/AIDS, overall health budgets been reduced to spend less in other areas of health service.

The focus on infectious and non transmitted contagious diseases as well as the cost to finance health services have implications for telemedicine. Telemedicine projects would also have to compete for financing and justify an emphasis on utilizing Information, and Communications Technology (ICT) to deliver better health service as well as provide more people with access to health care.

According to the Human Development Report 2002, six of the 13 Caribbean countries mentioned had less than 100 physicians per 100, 000, during people the period 1990-1999.

These were Haiti with eight, Guyana, (another country hit hard by the so-called brain drain), with 18, St. Lucia (47), Dominica (49), Belize (55), Trinidad and Tobago (79) and St. Vincent and the Grenadines (88). The Dominican Republic had the highest number (216).

The shortage of physicians is, therefore, noted in the wider Caribbean. Apart from a handful of offshore medical institutions, such as the School of Medicine at St. Georges University in Grenada, most medical students seeking in the English-speaking Caribbean have to turn to the University of the West Indies campuses in Jamaica or Trinidad and Tobago.

Medical training outside of the Caribbean is regarded to be more costly than within the region. Some online training is also becoming available.

### Caribbean experiences with Tele-medicine

Initiatives to use communications in the delivery of health care generally fall into various categories. There are efforts to co-operate bilaterally or between institutions of different countries. There are medical training and projects that involve using telecommunications to transmit data and texts to assist in some diagnosis, or in an actual operation.

While these descriptions reflect some of the attempts in the Caribbean, the goals of major telemedicine programmes internationally are far more extensive. Such programmes recognise that there are communities that are below service in health services. In the Caribbean the main hospital might be located near the capital city and its large population while rural communities might be underserved.

In addition to enhancing services to a wider national population, telemedicine projects also aim at reducing the cost of health care in the national budget. One example could be in the form of reducing the cost of transportation of ill citizens, by simply taking health service to those citizens.

More efficient utilization of resources, both in terms of human resources, as well as equipment, is an other goal of implementing telemedicine services.

In the research for this project, surveys hare been sent to Government Chief Medical Officers, and individuals with similar titles, as well as private institutions, in 26 Caribbean countries. Representatives of the Pan American Health Organization (PAHO) and officials at medical institutions, universities, off shore medical institutions, and civil society practitioners, were also contacted. However, only four surveys were returned from government sources, this could reflect the view by PAHO officials, that telemedicine programs are yet to be rolled in a significant way.

In several cases, and this was the argument for Belize, the official word was that there were no telemedicine projects on the way.

But additional research has provided more interest, major efforts in progress or plans to use Information and Communication Technology in health care.

**Institutional initiatives**

The University of the West Indies has been involved in mounting and participating in telemedicine conferences since the late 1970s, if was instrumental in having an audio-teleconference link, set up between the Bustamante Children's Hospital and an institution in Canada, in the early to the mid 1980s. Through this link, several teleconferences were conducted for information exchange and education.

An unpublished paper Christine Marrett, Campus Co-ordinator (Mona, Jamaica) and Senior Projects Officer, University of the West Indies, notes that, in 1978, the UWI began experimenting with telecommunications, as one possible way of meeting some of the regions needs for education, in an initiative known as Project Satellite. It linked the Mona and Cave Hill campuses of the University via two NASA satellites: ATS-6 for outgoing full-motion video from Jamaica, and ATS-3 for return audio. The programs mounted included discussion on rural medical care.

During the two months of the experiment, 27 programs (including the medical ones) totaling 34.5 hours were organized and produced by UWI staff with the collaboration of several institutions, in the Jamaica Broadcasting Corporation, the Goddard Space Centre, the University of Miami, and the Colorado's Solar Energy Research Centre in Golden, Colorado.

After Project Satellite, there was a three-year feasibility study, the Caribbean Regional Communications Study (CARCOST). The aim of CARCOST was to determine whether and how, interactive distance teaching and teleconferencing could contribute to education and public service in the Caribbean. It suggested that the way forward was the appropriate use of telecommunications, coupled with the willingness of the countries to share resources and add small needs into an economically viable package.

With the support of various groups of Ministers, including the Caribbean Conference of Ministers responsible for Health, who at a meeting in Belize in July 1981 gave support to the establishment of a telemedicine project, the UWI implemented the UWI Distance Teaching Experiment (UWIDITE) in 1982.

UWIDITE, with funding provided mainly by USAID, established an audio-graphic telecommunications network, initially linking five of the countries that support the UWI. The network was used for interactive distance teaching, and other types of teleconferences. The network expanded to include other countries, and centers as funds became available.

The UWI assumed full financial responsibility for UWIDITE in 1986, and it then became known as the UWI Distance Teaching Enterprise. In 1996, with the expansion of distance education at the UWI, the operations of UWIDITE were incorporated into the UWI Distance Education Centre.

From the early years of UWIDITE to the present, health programs have been an important aspect. Not only has there been formal programs for health personnel, but also medical practitioners, such as members of the departments of Child Health and Surgery, that used the network to hold discussions among themselves on cases of interest.

Health programs have included: Emergency Health Management, Consultations/Case Presentation in Obstetrics and Gynecology, Undergraduate and Postgraduate review sessions in Obstetrics and Gynecology, Fertility Management Nutrition for Community Workers, Legal Aspects of Nursing, Environmental Health Management, Cytology and HIV/AIDS.

In March 1993, with funding provided by CIDA, pediatric surgeons and other health workers across the Caribbean and in Canada, participated in a three and a half-hour pediatric surgery update teleconference, linking the Canadian and Caribbean networks by telephone. Under the auspices of the Canadian Association of Pediatric Surgeons (CAPS) and the UWI Faculty of Medical Sciences, the CAPSOUWI (CAPS Outreach with UWI) teleconference facilitated interaction between pediatric surgeons in Canada and child health workers in the Caribbean. Presentations originated from the Children's Hospital of Eastern Ontario, and the St. John's Hospital in Newfoundland, Canada, and from the St. Augustine and Mona campuses of the UWI.

Two Masters level programs, one in Counseling and the other in Family Medicine, are now being offered.

Among countries studied in the survey, the **Multimedia Version** of this book presents a compendium of recent experiences with more details, from:

- **Antigua and Barbuda,** under the aegis of the Caribbean Telemedicine Organization (CARTMA).

- **Barbados,** and the national concern for the use of Information and Communication Technologies considered in Barbados at the level of Civil Society, with the Barbados Association of Non-Governmental Organizations (BANGO).

- **Belize,** describing how a team of doctors from Campeche, Mexico, went to the Corozal Hospital so that a mobile clinic from Campeche would arrive bi-monthly with a team of specialists.

- **Guyana** and an attempt at using basic communications as a telemedicine trial was carried out in Guyana in 2000.

- **Jamaica and** the focus at the University of the West Indies (UWI) at Mona activities.

- **Puerto Rico** presenting the Puerto Rico Telemedicine Pilot Study implemented with the Government, installing a communications system between the municipality of Vieques and the Tertiary Medical Center Emergency and Radiology Dept. in San Juan.

- **St. Vincent and the Grenadines** that is developing a plan, currently at an early stage, whereby Government would own a wide area network (WAN) linking the local area networks (LANs) of its various ministries and agencies.

- The **Dominican Republic** stands out as a Caribbean country whose Government has introduced a major telemedicine project, that is designed to make an impact on several provinces, including rural communities. In the Multimedia Version you will find various presentations regarding Telehealth in the Dominican Republic.

- Meanwhile, **Haiti** has done an important work on a feasible study for a Telemedicine with the expertise of ITU.

- The **Martinique** has received telemedicine attention through a project that uses high-speed data communications to diagnose general emergency cases.

In the **Multimedia Version**, see More information regarding these countries.

**Conclusions for the Caribbean Region**

The examples cited, show that, the administrations if Puerto Rico and the Dominican Republic had to take a pro-active approach to devise and implement telemedicine and telehealth policies and programs. In the case of Puerto Rico, clear benefits have been quantified in dollar and social terms.

In some island nations there is scope for similar projects that extend medical services into rural communities, and maximize scarce medical expertise, for example Jamaica. The case of CIMIC in St. Vincent and the Grenadines, illustrates that communications technology can be used to provide services nationally, even in small countries; but there are issues of identifying funding and establishing sustainability models, due to the low incomes. CIMIC also showed how the availability of national services could reduce the need for patients to make expensive trips to medical facilities in neighboring islands.

There are also many examples of attempts at pilot projects using medical expertise regionally or internationally and much scope for medical distance training.

Connectivity for the region remains an issue, as the most that is attempted might mean higher end technology and increased cost. Closing the Digital Divide envisages providing all citizens, and in particular those without access to modern communications, such as the Internet, with access to Information and Communication tools and technology.

Several initiatives are under way to tackle the "Digital Divide" by establishing Multi-purpose Community Tele-centers in the region. The Caribbean office of the International Telecommunication Union (ITU) has helped centers in places such as Suriname and Trinidad and Tobago, and is working on a plan for Haiti, which could incorporate telemedicine resources.

The Pan American Health Organization (PAHO) is also working with some governments to devise programs on telemedicine.

**CENTRAL AMERICA**

In the **Multimedia Version,** by browsing the map, you can surf country-by-country, noting the efforts of the subregion in connection with the information society and joint efforts made to contribute to the preparatory work for the World Summit on the Information Society 2003-2005.

Most Central American governments have begun efforts to bridge the digital divide and promote connectivity, in keeping with the principles of the Agenda for Connectivity in the Americas.

The Pan American Health Organization (PAHO), through the Distance Education Office of the Autonomous University of Puebla (UAP), has requested that the Puebla telemedicine project be executed not only in Mexico, but that it be expanded to include all countries of Central America.

The Puebla telemedicine project has three basic components: education, research, and services/advisory services.

The health item will include:

- Teleconsultation and telediagnosis;

- Preventive medicine and database;

- Education

This education section will include medical professional development, training, and refresher training. This section also requested by Central America; accordingly, physicians from seven countries will be trained from Puebla via distance courses. The UAP undertook to design these courses, to be offered in late 2003.

For its part, the Government of Guatemala has undertaken to develop and promote the use of ICT tools and applications in public health, in a broader information society action framework.

To that end, it has promoted, among other works on the development of ICTs, discussion papers on telemedicine and has participated in different regional and international meetings on this topic, specifically, all meetings related to the World Summit on the Information Society,[16] as well as the Summits of the Americas. In the latter, health is underscored as a priority development task, with a view to reducing the digital divide in the region.

The Ministry of Public Health of El Salvador has incorporated the use of ICTs in its daily administration of the health area. Among other initiatives, citizens and health professionals may access Ministry of Health information via its Web site. This site provides valuable information on public health policy, on site-activities, and information on the Ministry's political leadership, technical personnel, and administrative organization.

In the **Multimedia Version**, see: USEFUL ADDRESSES/MINISTRIES OF HEALTH

**Costa Rica** is a lead Central American country in respect of state policy to promote mass use of information and communications technologies. As a result of such policies, in December 2002, Costa Rica showed an Internet penetration rate of 20%, among the highest in developing countries.[xxv]

Different international organizations, such as the International Telecommunication Union (ITU),[17] indicate that levels of Internet penetration and quality of Internet service are high and tariffs relatively low as compared with most countries of similar levels of development.

The Ministry of Science and Technology of Costa Rica has responsibility for promoting, from the executive branch, information society development policy.

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[16] See the Declaration of Tegucigalpa, the Declaration of Bávaro, and the Declarations of the Summits of the Americas.
[17] http://www.itu.int

More specifically, at the level of telemedicine, the Costa Rican Social Security Fund is the body with responsibility for the hospital system, where the Hospital Telemedicine Project is being executed, in which the Association of Medical Information Technology is participating. The Association is one of the leading local promoters of health applications of ICTs.

In respect of telematics instruments, Costa Rica has made major advances. In the case of telemedicine, a platform is being used that was designed locally in partnership with University of Rochester of the United States and the Massachusetts Institute of Technology (MIT Media Lab).

Since 1994, Honduras has conducted different projects with a view to establishing communications between rural health centers (Productive Health Units - UPS) and health care centers in the largest cities.

In 1998, as a result of the damage caused by Hurricane Mitch, Honduras attracted the attention of the international community, and different telemedicine projects were proposed. The involvement of the **Executive Branch** of the Republic of Honduras in the development of telecommunications platforms for health structures in rural and disadvantaged areas is significant.

In the **Multimedia Version**, see: HONDURAS further information is available on its HF health data transmission project.

**Nicaragua** is involved in the development and promotion of ICT tools and applications in public health in a broader action framework: that of the information society. To that end, it participated in the aforementioned efforts.

In the academic sector, in the framework of Plan Puebla Panama, plans are being developed for binational research projects alternatives for new lines of health research and telecommunications applications in health.

Lastly, the above-mentioned project seeks to offer health services to highly marginalized groups, including communities that send large numbers of migrants to the United States.

**Special programs and activities**

In 1998, as a result of the damage caused by Hurricane Mitch, different humanitarian initiatives directed their attention to this part of the world. In Guatemala and Honduras, ties were established between the Landon Pediatric Foundation, with assistance from the RAIN organization[18], the American College of Chest Physicians, the business community, and rural communities in the two countries. This initiative, emanating from California, United States, was implemented in 1999, and enables pediatric patients to be monitored from a remote location and by Internet by United States surgeons who have performed surgery on them.

In the **Multimedia Version**, see: HONDURAS and GUATEMALA, further information is available on international community involvement as a result of Hurricane MITCH.

In **Panama**, the national government is implementing the National Telemedicine Plan (PNT), under the direction of Mr. Silvio Vega. The PNT is now in its pilot phase, with its central and operational bases in the Faculty of Medicine of the Technological University of Panama, the Social Security Fund, and remote locations within the country at Chinguinola, Chitré, Las Tablas General Hospital, and Bocas del Toro. It is anticipated that, in the next phase, 17 points will be connected.

The University of Arizona (United States) provided support for the National Telemedicine Plan, support that was vital in the initial phase, as it provided the necessary equipment and training for professionals and workers.

In this phase, the government provided connectivity, with a view to providing a fiber optic network for the PNT's locations in the future.

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[18] See http://www.rain.org/~landon/Heartweb/ and http://www.rain.org/.

In the **Multimedia Version**, see: PANAMA/COUNTRY PROJECT contains further information on the National Telemedicine Program of Panama

**Legal framework**

The legal framework takes a global approach to the information society.  For example, in Costa Rica, the objective of the electronic signature bill is to enable commercial and legal transactions to be carried out on-line and to streamline administrative operations.  The electronic signature and the traditional signature on paper will be equally valid, and may be used interchangeably in the health sector.

**Training of health professionals**

In **Honduras**, the Wireless Communications Program for Rural Productive Health Units has established the use of distance **cooperation protocols** among sector professionals.  These provide for exchanges of clinical, epidemiological, and other data corresponding to the basic information transmitted via telemedicine networks.

Through such protocols, physicians, nursing officers, and health workers comprising the network have gained basic concepts of network cooperation, one of the preliminary conditions essential to a telemedicine project.

In **Panama**, at central locations and locations within the country where pilot experiences are being implemented, there is sustained interest in this area, and some locations have prospects in this area.

**SOUTH AMERICA**

Most countries described in this section have an inherited aptitude in the professional training area. Since remote colonial times, the quality of the curriculum of the universities of Brazil, Chile, and Argentina has rivaled that the rest of the world's institutions. In addition, students and professionals of Uruguay and Paraguay have traditionally participated actively in academic activities.

These educators have played a pioneering part in the use of ICTs in the health area. One paradigmatic example is the first closed circuit television (CCTV) transmissions of surgery in Latin America, performed in August 1950, in the Faculty of Medical Sciences of the University of Buenos Aires. These were introduced by the First Lady, Mrs. Eva Duarte de Perón, and Minister of Health, Ramón Carrillo, in a major gesture of support for scientific and technological innovation as state policy.

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In the **Multimedia Version**, see: ARGENTINA/BACKGROUND/MEDICAL VIDEO, BUENOS AIRES 1950.

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This concept of state policy is also employed in the health sector of **Brazil**. The 1988 Constitution provides that health is a "right of all and a duty of the state, to be addressed by economic and social policies designed both to reduce the risk of disease and other damage to health and to provide universal and equal access to activities and services to promote, protect, and recover health."

Accordingly, the public health system was organized into as a public, federative, decentralized, participatory Single Health System (SUS) for comprehensive care. This decentralization has been evaluated by different international organizations as a successful reorganization model.

At the same time, since 1994, the Ministry of Health has promoted the family health program as the core of its primary care strategy. This program is based on the establishment of reorganized health units, which work by network in a particular area, the family unit being the focus of care efforts.

In parallel, the federal government has made the information society a priority. Both ANATEL and SOCINFO work to provide support in the form of infrastructure, resources, and connectivity services, the vision and theoretical objectives of the information society.

It may readily be understood that Brazil, in view of its subcontinental character, has vast potential for the implementation of telehealth solutions, whether these are support **tools**, tools to promote such solutions, or those to be used in implementing state health policy.

In **Bolivia,** in the framework of the public health strategy, aspects of telehealth were incorporated in legislation, and, in Law 2235, resources were allocated for that purpose.[19] The Multimedia Version of this book includes contains the telehealth-related provisions of that law.

**Chile,** for its part, has an administrative structure much more centralized in Santiago, the capital. However, efforts to decentralize medical and therapeutical activities led the government to study alternatives to enhance specialized medical knowledge in the different regions. Chile has 12 Regions, dividing the country from north to south. Many of them have insufficient qualified personnel. The health system provides the newly qualified doctors must perform professional social service for a period, before they may specialize. These young professionals are sometimes found in very remote locations.

The government has addressed this reality by implementing different pilot telemedicine projects with different public and private sector entities.

**Colombia** has a large number of telemedicine, distance education, and telehealth initiatives. The country has made an exhaustive survey effort through the use of on-site surveys, which are included in the **Multimedia Version** of this book.

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[19] For further detail, see the documentation on Bolivia in the CD-ROM version of this book.

Since the early 1990s, pilot telemedicine initiatives have been launched in the Andes subregion, although, at the end of the 1980s, the topic was being discussed in academic forums. In general, scant information was available on pilot projects, projects under way, and trials.

The communications sector has given impetus to such initiatives. In addition, ICTs are increasingly integrated into and assimilated by the health sector. We point to the following international organizations for the part they have played: the ITU, CITEL, WHO-PAHO, and others. Here again, for pilot projects, international cooperation is essential.

The Andean subregion has participated actively in holding and participating in congresses on telemedicine and information technologies.

Some of the pilot initiatives have been implemented via own channels (at high cost); others over low quality connections (such as switched telephone lines); and others via the Internet (with bandwidth and security problems). Here, the great hope of the region is the advent of Internet 2, which will make possible public connections utilizing greater bandwidth, with better levels of security, permitting real time communications - highly useful in health information - and the possibility of interactive interconsultations.

The Andean Pact region, to which Colombia belongs, has made available a series of study documents for inclusion in the **Multimedia Version** of this book**.** This highly valuable information comprises a complete study of the different aspects of telehealth in the countries of the Pact.

Although in **Peru**, projects are under way that have given significant indications of sustainability, no national program pertaining either to telehealth or to telemedicine as such is yet in place. Only isolated initiatives have been noted, in the public and private sectors, of which, for the most part, the public is unaware.

Thus, the Special Technical Telehealth Commission has established as a priority function to propose the necessary policies, plans, and projects for implementation of a national telehealth program. This program also provides for bringing together and integrating all initiatives in each sector, in general, to raise public awareness of all of them and encourage their use.

In **Ecuador**, the National Agenda for Connectivity includes a chapter on health that assesses telehealth in the country. The Agenda proposes making an inventory at the national level of both public and private institutions and to study and categorize them according to their level of incorporation of ICTs. Such information is essential for the projections of the current and future Telehealth Commission plans.

**Paraguay** has assigned priority to the information society area, creating a "National Plan for the Development of the Information Society," whose implementation is to be coordinated by the National Information Society Commission (CNSI), in which participate government areas, nongovernmental sectors, and universities. One such entity is the Ministry of Public Health and Social Welfare (MSP y BS), the entity with responsibility for telehealth-related topics and, in particular, telemedicine.

The Eastern Republic of **Uruguay** is developing instruments pertaining to the development of the information society and reducing the digital divide. On August 8, 2000, in Decree 225/00 of the Council of Ministers, the **National Committee on the Information Society** was established, with a view to promoting the National Strategy in this area.

In **Argentina**, since 1997, the Secretariat for Communications of the Office of the President of the Nation has coordinated official efforts in this area.

Two programs were initiated: in 1997, the National Telemedicine Network, in which eight public faculties of medical sciences were incorporated through videoconferencing; and, in

1999, the Networked Hospitals project, launched in that year.  The country subsequently hosted the Second World Telemedicine Symposium for Developing Countries, organized by the ITU.[20]  Networked Hospitals has provided some 100 hospitals with telemedicine terminals of four levels of complexity and connectivity.  The two projects came together in June 2000, in a National Telemedicine Project, included in the National Program for the Information Society.

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In the **Multimedia Version**, see: for additional information on each country.

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As **French Guiana** shares a border with northern Brazil, it collaborates with its neighbor in the health area.  Among such efforts are the launch site for the European rocket and the Centre National d'Etudes Spatiales (CNES) of France, which, with its affiliates and within the S2E consortium (Epidemiology and Space Satellites), is developing ICT solutions applied to health. In addition, French Guiana is implementing a telemedicine project with the French Ministry of Health and the Prefecture of Guyana.

In **Venezuela**, the network of Venezuelan Centers for Bioengineering and Telemedicine, comprising  Simón Bolívar University (USB), the University of the Andes (ULA), and the University of  Carabobo (UC), participates in three telemedicine-related international initiatives:

- The Graduate Cooperation Program (PCP) (France and Venezuela).
- The ALFA Program in Bioengineering (Spain, France, Ireland, Brazil, Colombia, and Venez uela) for research and doctoral training.
- The TELAMAZON project, the French proposal for Latin America on telemedicine, covering six countries of the Amazon region (Bolivia, Brazil, Colombia, Ecuador, Peru, and Venezuela) and has the support of the Ministry of Health and CORDIPLAN.

Along with this network is the effort to establish the **Telemedicine** and **Medical Information Technology** Telematics Network.  The objective of this network is to promote and facilitate cooperation and exchanges of knowledge among groups on topics pertaining to telemedicine, clinical information systems, and biomedical imaging and signals.

The group seeks to become a good reference point in the region in the telemedicine and medical information technology area, and to facilitate travel by and exchange among expert researchers of the groups comprising the telematics network, with a view to exchanging useful information on methods, instruments, results of research projects, and pertinent initiatives within the region.

The topics to be discussed via the network, corresponding to the experience of the participating groups, are telemedicine in rural areas, teleradiology, home telemedicine, emergency systems (disaster assistance), computerized clinical histories – Electronic Clinical Records, medical terminology and vocabulary, guidelines for medical and clinical practice based on evidence, medical and genomic databases, processing and visualization of medical images, and patient diagnosis and monitoring systems.  KEY WORDS: Telemedicine, Electronic Clinical Records, Genomic Databases.

**Chile** has made different efforts at the level of pilot projects and special activities.  The most promising is the Northern Network, begun in the Roberto del Río Hospital in Santiago. That Hospital carries out project coordination and leadership functions.  The Ministry of Health, through its health sector Information Technologies Coordination unit, provides the technical support and simultaneous output to eight points, through a multipoint system.  The team's experience has made it possible to enhance the human factor in telehealth.

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[20] See http://www.itu.int and "Events" on the CD-ROM version of the **Book on Telehealth in the Americas.**

Although, in **Brazil**, in recent decades, 25%-35% of investment in promoting scientific and technological activity has been allocated to health, such investment depends on extra-sectoral support, mainly from federal agencies. This may be one reason why no federal telemedicine project has thus far been implemented at the national level.

In the State of Río de Janeiro, the Oswaldo Cruz Institute Foundation (FIOCRUZ), lead entity in all aspects of epidemiology, is executing different projects and initiatives for the incorporation of ICTs, with a view to establishing inter-institutional cooperation networks for computerization of their libraries and for purposes of education, of both health professionals and specific groups, in particular, students.

The Federal University of São Paolo, in addition to executing different telemedicine and professional distance training projects in different specialties (oncology, traumatology, rehabilitation, and physiotherapy), has integrated into its undergraduate and graduate curricula introductory courses pertaining specifically to information technology and telemedicine. This university may be considered a leader in health telematics initiatives. In parallel, in collaboration with the Federal Ministry of Health and the World Health Organization (WHO), in 2002, a Virtual Ophthalmologic Diagnostic Center was launched.

In 2001, the Ministry of Health incorporated a telemedicine project in the Family Health Program: the Telemedicine in Family Health Program (UFPE - MS), this component continuing to be included in the Program since that time. Its evaluation has yet to generate the preliminary conclusions.

**Paraguay** has a public health project, developed with assistance form the World Bank, which includes a "Maternal Health and Child Development"[21] component, and a component on strengthening management for decentralization of health services in project areas, which contain proposals for the use of ICTs. Project status information may be found on the World Bank's Web site, Project ID number P007927.

The following programs are under way in Uruguay: CLAP (PAHO/WHO), Latin American Center for Perinatology and Human Development, INFECTO Profilaxis, Diagnosis and Treatment of Infectious Disease, and NEP, Clinical History of Epilepsy.

Lastly, in Argentina, since June 2000, in the framework of the **National Program for the Information Society (PSI)**, a single project, the **National Telemedicine Program,** has been executed, incorporating the 106 points of the two earlier projects. At that time, a multisectoral proposal was forwarded to the different health sector players and ICTs, thereby opening the project to full public and private participation. This proposal was presented as a document to the World Health Organization and the International Telecommunication Union for their consideration.

Since March 2001, the project has suffered the vicissitudes of the national political situation, which culminated in the crisis of December 2001. The Secretariat of Communications of the Nation made highly commendable efforts to maintain its continuity and, despite extremely limited resources, to engage in multisectoral dialogue with health authorities, members of civil society, and related companies. Since the new President was elected in May 2003, authorities have studied, with different sectors, how to redirect the project in a manner consistent with public policy and national possibilities.

As regards the **legal framework**, as we have seen, most of the above-mentioned countries are implementing initiatives for the development and promotion of the information society and the use of ICTs by society. In general, it is in such a context that legal initiatives affecting the development of telehealth are being developed.

Accordingly, in **Argentina** regulations to the law on electronic signatures are being implemented, thereby providing telehealth with a tool to ensure the qualifications of the

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[21] See www4.worldbank.org/sprojects/ Results.asp?st=DetSrc&Coun=PY

professional providing service through the use of ICTs.  In addition, the Argentine Medical Association included in the 2001 edition of the medical ethics code different chapters pertaining to telemedicine and telehealth.

In **Brazil**, directives pertaining to the Single Health System (SUS) are established in the "Basic Operating Provisions (NOB)," adopted earlier in the organic legislation on health.  We are not aware of ad hoc texts or regulations pertaining to telemedicine and/or the use of ICTs specifically in the health area.  However, legislation pertaining to general use of ICTs, in particular, texts and provisions on privacy, the security of transmitted data, digital signatures, and user recognition may be extrapolated to the health area, taking into account the country's codes of ethics and its medical and legal aspects.

**Paraguay** does not have in place legislation pertaining specifically to telemedicine or telehealth, but the concept in use is that the responsibilities of the "real world" must be reflected in the "virtual" or electronic "world," apply to clearly defined specialties, and apply to each information layer.  This is a coordinated effort of the Medical Board of Paraguay and the MSP and BS, legally authorized to revoke licenses for contravention of good practice.

Lastly, in **Uruguay,** digital clinical histories and paper clinical histories are equally valid.

**Pilot experiences**

Numerous pilot experiences have been carried out in the Americas region. Several have been included in the **Multimedia Version** of this book.

It would not do justice to such experiences merely to attempt to cite them in this chapter as, as well as being unable to cover all pilot projects meriting mention, we would not be able to provide any type of useful explanation, such as value added, reasons for success or failure, factors promoting their sustainability, criteria that might be reproduced, etc.

In the **Multimedia Version** of this work, we have incorporated different ways such projects may be accessed:

- Nearly all have been included in the COUNTRY PROJECTS chapters in each country description. These may be accessed by browsing the map, through CONTENTS, or via the SELECT A COUNTRY menu on the lower bar.
- Projects have been classified according to the types of applications and services they provide: telemedicine, distance education, tele epidemiology, or research networks and telemanagement. These may be accessed through PROJECTS BY AREA, selecting one of the four areas or selecting telehealth, which contains all projects.
- Using the NOTABLE PROJECTS menu, from Home.

The list is not intended as exhaustive, but rather to reflect different experiences that may be useful to the readers as control cases and case studies.

**Programs under way**

Most of the well-established programs in the region that have given indications of sustainability have been included in the **Multimedia Version** of this book.

Notable among them are the programs implemented or at least promoted by national governments.

The **Active *e-Health* Program,** part of the ***e-Mexico* Program,** is a clear example of state involvement in the telehealth area. This is a broad, multisectoral program involving different government areas and including private sector participation. It simultaneously implements different lines of action, at different levels.

**Health Information Highways, in Canada,** has marked dissimilarities with the e-Mexico Program. It more resembles a funding program, but it is highly effective and some of its thematic areas take account of the future Agenda for Connectivity.

Different programs are under way in the United States, including those promoted by the Telemedicine and Advanced Technology Research Center **(TATRC)**[22] of the Department of Defense, which nearly always works in collaboration with other United States teams or those of other countries with a view to developing technological solutions.

Although the program is at present on technical stand-by status, the **National Telemedicine Program** of Argentina has great potential for effective implementation, not only because of the large amount infrastructure deployed, but also because there is genuine demand for it on the part of senior officials of remote structures.

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[22] See www.americantelemed.org/conf/2002%20ABFI%20Presentations/
MONDAY/05RSessions.ppt

Although they are not programs per se, the **American Telemedicine Association** (**ATA)** and the **Canadian Telehealth Society,** through contributions to telehealth in the region they have made, are ensuring that the activities they promote will be included in a program of their own.

Lastly, to be underscored are the different **U.S. National Library of Medicine** initiatives**,** in particular, the on-line publication MEDLINE, which is made available free of charge via the Internet.

**Sectoral Investment and Expenditure**

**Public and private sector investment and expenditure on health**

This chapter contains a country-by-country summary of investments and expenditure on health in the countries of the region, with a view to simultaneously providing:

- An overview of the efforts made in each;

- A study tool which, in conjunction with telecommunications indicators and indicators of investment in that sector, provide an overview of the possibilities of implementing telehealth solutions, networks, and programs in the future.

It is based on the 2002 edition of PAHO: **HEALTH IN THE AMERICAS**, Volume II.

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The **Multimedia Version** contains:

- In GENERAL INFORMATION, useful information on each country, including data on the type of health system, diseases of greatest incidence or mortality, etc.

- In EXPENDITURE ON HEALTH AS A PERCENTAGE OF GDP, an updated graph showing these percentages

EXPENDITURE ON HEALTH/EXPENDITURE ON HEALTH BY COUNTRY contains a summary of expenditure and investment by country, taken from the 2002 edition of PAHO: HEALTH IN THE AMERICAS, Volume II.

EXPENDITURE ON HEALTH/GRAPHS contains graphs showing the data on each country, for purposes of comparative analysis.

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By way of example, the comparative graph below based on the aforementioned data shows, for South America, the percentage of expenditure on health, public and private sectors.

**Investment in Communications Infrastructure and Networks**

In the **Multimedia Version** of this book, you can examine some of the works prepared at the request of the ITU on the different indicators of telecommunication density and other indicators of the digital divide.

In the framework of world and regional initiatives being implemented to accelerate the process of entering the information society (IS), the International Telecommunication Union, with the support of the Telecommunication Development Bureau, has prepared this work, which studies the evolution of the region's key indicators and statistics.

The Multimedia Version contains most of this data in graphic and table form.

The first series examines telecommunications infrastructure: lines in operation from 1982 to 2002. In the latter year, there were 297,535 miles of fixed lines in service, of which 63% were in the United States, 6.7% in Canada, and 29.4 % in Latin America and the Caribbean.

The proportion of digitized fixed networks is one factor impacting prospects for implementation of telehealth projects.

In the 1990s, many Latin American and Caribbean countries privatized, wholly or in part, their public telecommunications companies. This partially accounts for the major increase in the number of lines, as a result of to different supply and demand factors, as contractual obligations established increasing line penetration targets during the exclusivity period and, in many countries, there was unsatisfied demand and even waiting lists.

Harder to quantify is the impact of deregulation policy and the opening of markets. In any event, such policies have only suggested that they might generate more competition in the future, except for the cases of the United States and Chile, where competition is broad. This, however, has not altered the business panorama for the "dominant" firms, which, in general, are the incumbent or established companies.

Another indicator is the number of cable TV subscribers, which gives an idea not only of current penetration, but also of potential developments in telehealth through the use of these types of network. Of a total of over 91 million subscribers, 69,369,000 are in the United States, approximately 8 million in Canada, and slightly under 6 million in Argentina. These figures correspond to slightly less than 25% of those connected in the United States, slightly over 25% in Canada, and approximately 16% in Argentina.

In addition, another indicator is Internet users and, in particular, the subscriber trend, which has been markedly upward in the United States and Canada since 1994, which was a takeoff point on a curve showing exponential growth; while in Latin America and the Caribbean, growth has been much greater since 1998. Other Internet penetration indices are provided in the **Multimedia Version**.

To summarize, the Internet user/GDP ratio is another analytical tool to be used along with the comparative health expenditure/GDP ratio.

**Trends in Telemedicine in a Globalized World**

This chapter sets out current and future trends in telehealth in terms of development at different levels: regional, national, local, and individual. It also outlines the human and technological requirements, immediate and future challenges, and other aspects related to the use of ICTs in the health sector.

The **Multimedia Version** of this book contains these elements in different, complementary chapters. However, to be noted how such topics are interrelated. References may often be repeated so that individual chapters may be read or re-read.

## Telehealth as a health development tool

In the health area, introduction of any unknown method, whether a new therapy or an innovative technology, tends in general to constitute an improvement over earlier alternatives: in most countries of the region, any pharmaceutical laboratory introducing a new medication, even if this is merely a new compounding of a drug with a different excipient, must indicate to the competent authorities how the product differs from other medications already on the market. Similarly, a medical technology provider will seek to demonstrate how its project constitutes an improvement for the different parameters involved in health care services.

Whether taking a macroscopic view initially focusing on the health of larger or smaller groups, including the study of an individual, such as a patient, or a microscopic view, such as studies of microorganisms, the idea is to enhance the health status of a given population.

From the perspective of the entities discussed in this work, such advances constitute a general concept of **health development.**

Thus, telehealth, its areas of application, value added services, the development of solutions, and the establishment of distance cooperation networks may be designed from a development perspective and distinguish, for reasons of clarity, between the development of individual health and development of the health of groups.

## Telehealth as a tool for the development of individual health

Individual health is defined by the WHO as a state of complete well-being, not only the absence of disease or infirmity, and account is taken of a series of factors impacting living conditions. It is well known that both life expectancy and low prevalence of individual pathology depend as well on the environment, living conditions, and habits – from eating to recreational.

Telehealth addresses this concept of health more comprehensively, rather than addressing it from a single area of health as does, for example, telemedicine.

The telehealth areas that pertain directly to the promotion of individual health are telemedicine and health distance education. The pertinence of other two areas is more indirect.

The Multimedia Version seeks to convey in diagrammatic form the interrelationships between these four telehealth areas. As may be seen, there are areas of interrelationship, which include specific applications both in the health area itself and in telehealth.

In the **Multimedia Version**, see: DEFINITIONS/DEFINITIONS SCHEME, moving the pointer over each area. If you stop at the intersections, you can see applications and/or activities related to the areas involved.

Most medical specialties that may be practiced face-to-face, without the use of ICTs, may be practiced through the use of telehealth. These technologies are used for medical care and for educational purposes.

Depending on the urgency of the problems to be addressed, specialties may be matched with ICT solutions to be employed.

The Multimedia Version contains different publications that contain guides to applications in keeping with the specialty or circumstances in which services are provided. An interactive diagram has also been provided to relate ICT applications and solutions to the care objectives of a telehealth project.

> In the **Multimedia Version**, see: DEFINITIONS/MEDICAL CARE TELEMEDICINE SCHEME and PUBLICATIONS.

The results of such approaches may be seen in the projects implemented.

> In the **Multimedia Version**, see: PROJECTS BY AREA, and select TELEMEDICINE and/or DISTANCE EDUCATION. See also PROJECTS, and browse the COUNTRY PROJECTS map.

All telemedicine applications and solutions seek to provide value added services or "e-services." Such ICT-based services seek to enhance services provided face-to-face, whether by providing better expertise, better use of time, or greater efficiency, by enabling solutions to be provided without the individual having to travel.

> In the **Multimedia Version,** see: PUBLICATIONS for further information.

In addition to the eservices that these telehealth solutions may provide to the individual, they may make it possible to implement more fully alternative types of care that improve individual care and reduce operating costs. This may facilitate, for example, alternatives for convalescence in complex structures more appropriate for less intensive care which, in general, are much closer to the patient's home.

Telehealth also enables mobile units to be designed to travel to small localities in order to provide all types of specialized care.

One final example is the development of telemonitoring and telemedicine solutions, which enable home care to be further developed, whether by telecare directly via home equipment, or by professionals who travel and are supported by specialists in reference hospital centers.

> In the **Multimedia Version,** see: the CINTERANDES project in Ecuador, and different projects in Canada, Colombia, Chile, and the United States.

**Telehealth as a tool for the development of the health of groups**

In most countries of the region, as different articles and papers in this area indicate, [xxvi] the public health sector has the twin objectives of ensuring access to health care services for most of the country's citizens on as equitable a basis as possible, and of exercising control over the upward trend in health costs, seen worldwide.

Different governments are aware of the added value of telehealth solutions as a tool to be used in making many of these reforms.

A recurrent theme therein is health system decentralization. [xxvii] Telehealth provides different instruments to facilitate the implementation of mechanisms for such reforms. One example is implementation of the **referral and counter-referral system[23].** Different countries are planning to utilize ICT applications and solutions to promote this system. On such country is the Dominican Republic, where the system serves as the basis for distance professional cooperation protocols.

Telehealth applications are also highly useful in different aspects of planning public health campaigns and activities. It may provide numerous tools for both the planners of such activities – at the central and the local levels – and for decision makers, whether or not belonging to the health sector, who are involved in regular or emergency decisions in which health is a major factor.

This is the case of **tele epidemiology applications,** which make possible increasing levels of interaction depending on the technologies involved, the available means of communication, and the degree of participation by the different players – whether local or central.

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[23] See www.poptechproject.com/pdf/01_024_007csb.pdf

Such applications range from georeferencing of epidemic focal points through the use of GIS applications, to mapping areas of risk of incidence of each disease studied, to complex landscape epidemiology[24] solutions through the establishment of multidisciplinary and multisectoral groups/consortia, to the development of tools based on predictive models, constituting early warning systems. One example is the work of the Argentine space agency, CONAE which, in collaboration with agencies of other countries (in particular, NASA of the United States, and CNES of France), is working on a landscape epidemiology mega project, comprising different complementary efforts.

In **Multimedia Version**, see: PROJECTS BY AREA/EPIDEMIOLOGY

At the level of public health planning, emergency telemedicine solutions, in particular, those including mobile interfaces coupled with resource management solutions (telemanagement), with or without GIS solutions, provide an array of **emergency management, crisis management,** and **disaster management-related** solutions. This combination of solutions enabled the effectiveness of resources assigned in coordinating and synchronizing rescue efforts to be enhanced significantly during the tragic events of September 11 in New York City, United States. At the First Meeting of the Permanent Consultative Committee I (PCC.I) of CITEL, held in November 2002, in Brasilia, a series of presentations was given on the role of telecommunications and, in particular, mobile solutions, in disaster management.

A less critical, but highly useful aspect is the assistance such solutions provide in developing a series of self-help tools, in the form of programs that can put together intelligent systems designed to assist professionals and decision makers in preparing their communities for a crisis or disaster.

There are many different types of alternatives for the application of telehealth solutions to assist groups and individuals. Apart from demonstration projects, solutions deployed may often be applied for either purpose (the development of individual or of group health), lending greater usefulness to infrastructures and resources and adapting activities to the different objectives, which joins efforts and reduces costs.

Accordingly, it is very important to ensure that the requirements of successful project implementation can be met.

**Requirements**

Some of these requirements are included in the prior project evaluation criteria set out in an earlier chapter, and are discussed at greater length in the **Multimedia Version** of this book.

At the individual level, we can distinguish the following types of requirement:

- Requirements of citizens and patients, as they are the end users of many telehealth activities. In this case, they must be advised of the use of ICT solutions by members of the professional health team. In different countries, the consent of the patient or their families is required at the time telehealth services are provided. It is also a good idea for local government, when they employ telehealth solutions, to inform citizens of their implementation.

- Requirements of health professionals when they are users of telehealth systems. In this case, which is the more frequent, professionals must be familiar with such solutions. Without acceptance of telehealth by the team as an additional tool for professional practice, it is very unlikely that it will contribute to project sustainability. Professionals must be trained in the use of the new equipment, but the group must also make efforts to adjust professional habits to cooperative practice from remote locations. At the same time, it is useful to underscore the legal and ethical aspects to be respected and adapted to professional practice in utilizing telehealth solutions.

Training for all types of users is essential when implementing innovative health projects.

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[24] See http://www.earthsky.com/2002/es020205.html

It is helpful to adapt tools and content to local level.  Language is often a barrier to the use of tools not been adapted to local circumstances.

Such adaptation must not be confined to form or language.  It is essential to propose solutions that address the priority health needs of the target populations.  The conclusions reached in studies in this area usually include the need for local adaptation.

At the level of requirements of groups, prior to implementation of telehealth projects, in addition to those mentioned above, a series of important technical requirements must be taken into consideration to ensure the successful operation of networks and projects.

Such projects depend on the characteristics of the telehealth activities and services it is sought to implement.  Put more generally, such characteristics determine the type of information to be transmitted; the level of connectivity required (bandwidth, on-line or off-line/dial-up connection, etc); and the information technology to be networked, for which storage systems play crucial role.

Most of these requirements are discussed in the Seminar on Standardization in E-Health, contained in the **Multimedia Version** of this book.

Evaluation of whether such requirements have been met involves the notion of "**e-preparedness"** or **"networked readiness,"** whether of a microenterprise, institution, locality, or country.

Evaluation of the level of e-preparedness is currently the focus of different studies.  Such studies will provide overview by studying the productiveness of a region in terms of the implementation of ICT solutions for society.

One of these studies emanates from Harvard University's Center for International Development, presented on the World Economic Forum[25].



Networked Readiness Index

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[25] See http://www.weforum.org/
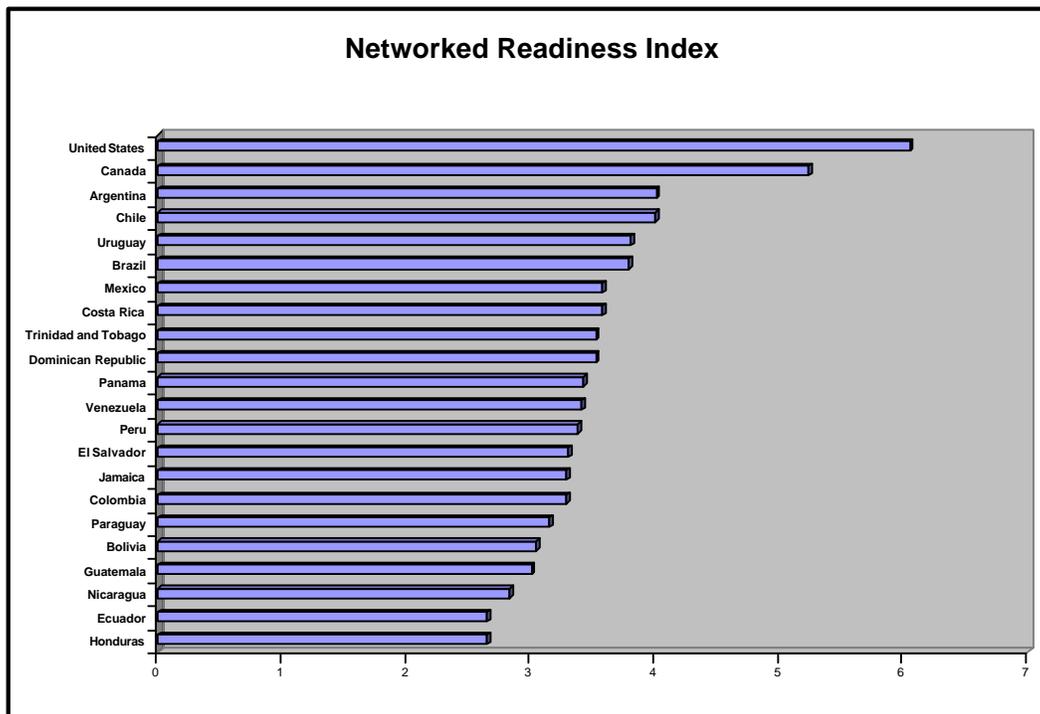
**Details of networked readiness indices for some countries of the region**
**Source:** Center for International Development (CID) of Harvard University,[xxviii]
United States

This study proposes a networked readiness index as a tool to assess the e-preparedness of countries for integration into the information society.

Although the index is suggestive, it cannot at present be concluded that it reflects networked preparedness in the health sector as, except for the United States and Canada, there is no direct correlation between it and the number of telehealth programs and projects under way.

However, consideration could be given to the usefulness of adapting this index to telehealth, including all areas and activities it covers, in a joint effort among the different sectors involved.

**Interoperability**

Although interoperability is a technological requirement, it is, in particular, a key element in the development of telehealth programs and projects. Without a minimum level of interoperability, cooperation in health through the use of ICTs, minimum levels of security and operating capability cannot be ensured. Different aspects of interoperability may be studied, in particular, technical and the human.
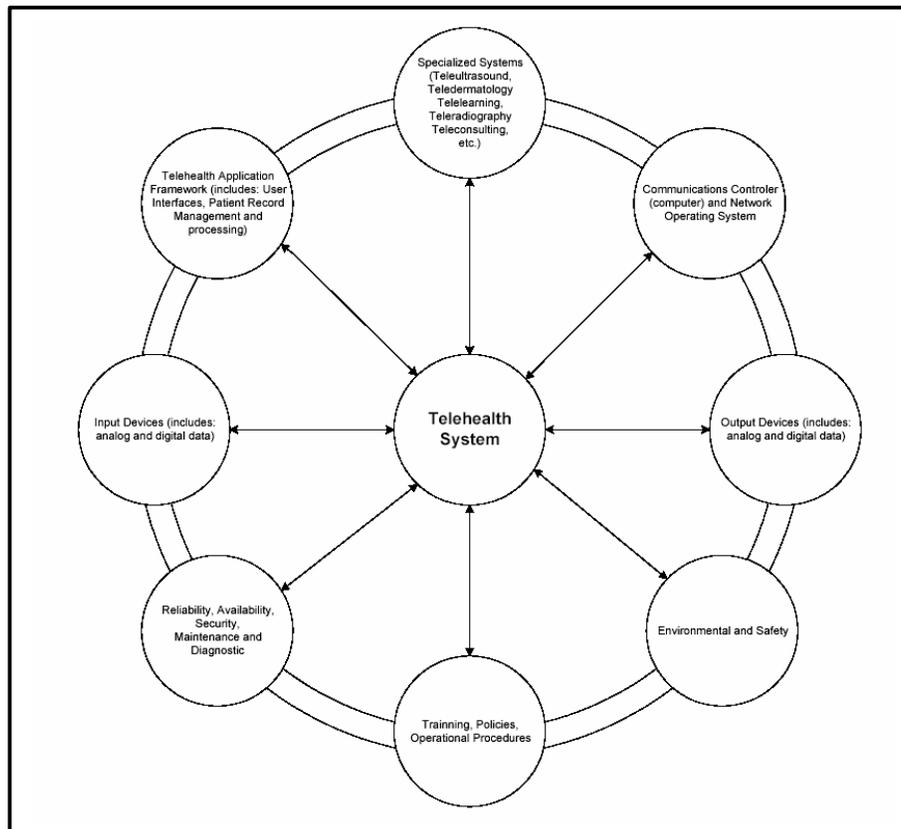
**Technical interoperability**

The different aspects of interoperability have been set out in the Seminar on Standardization in E-Health. The ISO/IEC has worked on interoperability standards for telehealth systems and networks (ISO/IEC TC 215/SC /WG 2.1)[26], and on Quality of Services. The results of these efforts were also discussed in that seminar.

> In the **Multimedia Version**, see: EVENTS/SEMINAR ON STANDARDIZATION and, in particular, among the presentations made at the seminar: /TUTORIAL AND CURRENT STANDARDIZACION OVERVIEW and /**INTEROPERABILITY AND QUALITY OF SERVICES**

This diagram shows the technical reference architecture for telehealth systems.

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[26] See www.americantelemed.org/ICOT/ ISO-TH-TR-Pt1-Nov-15-2002.pdf

Specialized Systems (Teleultrasound, Teledermatology Telelearning, Teleradiography Teleconsulting, etc.)

Telehealth Application Framework (includes: User Interfaces, Patient Record Management and processing)

Communications Controler (computer) and Network Operating System

Input Devices (includes: analog and digital data)

Telehealth System

Output Devices (includes: analog and digital data)

Reliability, Availability, Security, Maintenance and Diagnostic

Environmental and Safety

Trainning, Policies, Operational Procedures

### Human interoperability

Interoperability in telehealth terms does not depend solely on technological aspects, but also on opportunities for and capabilities of professionals to interact with one another regardless of distance and political and geographic barriers.

Telehealth solutions involve more uncertainty in terms of quality than they do in terms of quantity of data gathered, processed, and transmitted. In order to reduce probabilities of lack of appropriate information, it is advisable to follow distance work cooperation protocols. By such means, the steps to be followed and the information to be gathered are established for all phases of activity.

The "in the absence of (default)" notion frequently utilized in information technology is risky, as it may lead to failure to achieve a proper diagnosis. In particular, use of the concept of normal (or, in the case of telemedicine activities, not pathological) increases the probability of pathology being overlooked in diagnosis.

To be able to adapt or develop cooperation protocols, professional teams must deconstruct the steps followed in their different activities, for both telemedicine and distance education activities. If this is done, protocols will take account of adjusted professional habits and all participants will participate in them.

Other issues that may facilitate or complicate alternatives include business and contractual aspects, which may be may be incorporated more or less readily, depending on the national culture. Integrating some form of remuneration for professionals providing health services is of real importance to the sustainability of programs. Progress has been made in the United States and Canada in this area by establishing which telehealth activities are to be remunerated and which not.

An additional factor limiting possibilities for telehealth development involves issues of professional responsibility and jurisprudence in connection with transnational activities or activities between states and provinces of countries with federal systems (see ethical and legal aspects).

### Ethical and legal aspects

Within a region, legal aspects vary from one country to another. It is customary to extrapolate to the virtual from rules and legislation pertaining to non-telehealth practices, by way of reference. Some countries have legal and ethical codes and regulations that include aspects of the use of ICTs in the different telehealth areas.

Some of these rules and legislation contain technological solutions to ensure greater system security.

Among the most pertinent ethical and legal aspects is data **privacy**, included for telehealth, from a technological perspective, in the seven ISO implementation layers. Data security includes different user-dependent concepts, in particular, in connection with access to databases and all **cyber security**-related topics. Databases, principally those that can be used to establish a correlation between identity and pathological risk, are elements at greatest risk of external attack. Different solutions are available, not all applicable in all countries of the region, such as encrypting applications which, in some countries, are reserved to the military.

Other aspects to be taken into account are **professional qualifications.** This topic involves authenticity issues. It may readily be understood that systems must be available that can establish the authenticity of telehealth content and the identity of telehealth service providers. At this level, progress made in the countries of the region in connection with digital signatures, the privacy of personal data, and personal health data issues may be useful in the short term.

In respect of **professional responsibility,** in particular, in cases of possible medical malpractice, a single standard for the region has not been defined. Here, two approaches may be taken:

The concept of **electronic patient transportation,**[xxix] which considers a patient engaged in teleconsultation to be "electronically transported" to the physician attending him at his own practice, where he is licensed to practice, and subject to the regulations at that location.

Consideration may be given to aspects related to the patient's informed consent to the submission of all personal information, in keeping with each country's laws and regulations.

There is a possibility that the service provided may include participation by a less experienced physician. In this case, it is considered the physician in the patient's presence has responsibility for final decisions.

An intermediate possibility is application of the same rules and provisions that apply to medical practice without telehealth applications, with the possibility of shared responsibility.

**The good practice concept**

It is highly pertinent to make a retrospective study of the reasons why projects succeed or fail. Each year, different specialized congresses include this item on their agendas.

The ITU has begun work on this issue with Question 14/1-2, the contributions to which may be seen in the **Multimedia Version** of this book. The ITU is currently working on these aspects.

Good practice make it possible to offer a wider range of useful recommendations, with a view to enhancing telehealth project implementation.

From the outset, in efforts to develop good practices, a multidisciplinary and highly pertinent methodological approach must be taken, and all parties involved must be invited to participate effectively.

To that end, many recommendations advise that control cases be studied. This Book seeks to make a contribution to this Question by describing this series of projects and by involving the countries in promoting telehealth.

**INSTALLING AND LAUNCHING THE CD-ROM ON TELEHEALTH IN THE AMERICAS**

**INSTALLATION**

Insert the CD-ROM in the CD-ROM drive of your PC.

If the autoexecutable file does not start automatically in your CD-ROM reader, execute the file "**TELEHEATH**" from your PC to launch the presentation.

**LAUNCHING THE CD-ROM**



When the presentation has launched, the following screen will appear:

**Browsing the interactive map**



If you move the mouse inside the balloon over the map, you will see that three sections of the Americas can be highlighted.

You can select **North America, Central America and the Caribbean,** or **South America** by clicking on them.

For example, if you move the mouse inside the "Central America" section, this option is highlighted in a rectangular box. If you click there, the countries of that region will appear.

You can access the information provided on a country (e.g., Costa Rica) by clicking on it.

First, a general information screen appears.
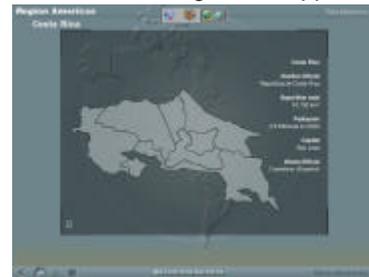




By clicking again on the screen, you can access the complete country menu, where you can obtain specific information by clicking on the options that appear.
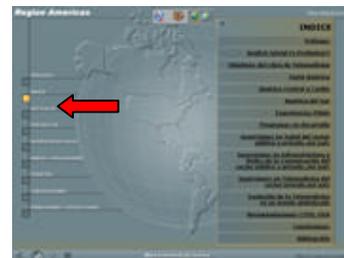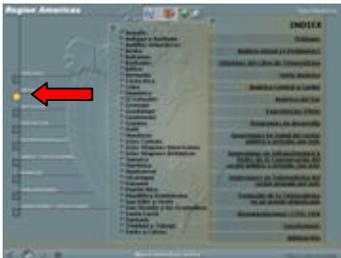
**Browsing the country list**



1. Click the button "select a country from the list," located on the right side of the lower bar



2. Then click on "CONTENTS" to the left of "Home."



3. Next, click on the "contents" list found on the right side of the screen, for example, on "Central America and the Caribbean." This will produce another menu, containing all countries of the subregion.



4. Finally, click on the country selected to access it directly.

**Using the menus of the CD-ROM on Telehealth in the Americas**

You can access specific topics by clicking on any of the buttons found to the left of HOME.

| | |
|---|---|
| **Forewords** | **Contents** |
| **Articles** | **Projects** |
| **Investment in health** | **Investment in telecommunications** |
| **Projects by areas and applications** | **Events** |
| **Publications** | **Useful addresses and sites** |



Lastly, there is a general control toolbar to be used to: (1) Undo, in reverse order, each of your most recent clicks; (2) Return to HOME from any location you are browsing in the CD-ROM; (3) Access different types of music; (4) Exit the presentation; (5) Access the conclusions and recommendations on TELEHEALTH given in the presentation.

*To access the Web pages of recommended sites, you must be connected to the Internet.*

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