PAN AMERICAN HEALTH ORGANIZATION
WORLD HEALTH ORGANIZATION

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## INFORMATION TECHNOLOGY AT THE PAN AMERICAN HEALTH ORGANIZATION

In today's world, virtually no viable organization exists without some—and often significant—investment in an information technology (IT) infrastructure. Desktop computers, mainframes, the network architecture, software, corporate applications, and telecommunications costs all form the basis of the information technology investment. That technology infrastructure then provides the mechanisms for collecting and effectively using information needed for programmatic and administrative decision-making.

As with other capital assets, the IT infrastructure must be regularly maintained in order to continue to be a useful tool for analysis and dissemination of information. The purpose of this document is to illustrate the level of investment in information technology in PAHO, the actions that must be taken to maintain that investment, and the factors that influence the information technology decisions. The document also describes the key IT initiatives which must be undertaken during the 2000-2001 biennium.

The ongoing funding for the maintenance of PAHO's technology infrastructure must be addressed. This document proposes one possible funding source for the IT initiatives.

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## 1. Introduction

The advances in the field of information technology over the past 25 years have, perhaps more than any single factor, dramatically changed the way in which people work. The development of the microcomputer, and the subsequent introduction of the Internet, have significantly increased access to information, allowed almost instantaneous communications across the globe, and placed computing power in the hands of each individual in an organization. In today's world, virtually no viable organization exists without some—and often significant—investment in an information technology (IT) infrastructure. Desktop computers, mainframes, the network architecture, software, corporate applications, and telecommunications costs all form the basis of the information technology investment. For PAHO, the replacement value of that investment today is over US$25 million.

The purpose of this document is to illustrate the level of investment in information technology in PAHO, the actions that must be taken to maintain that investment, and the factors that influence the information technology decisions.

## 2. Historical Perspective on Information Technology

Prior to the introduction of the microcomputer, processing large amounts of data was done solely on mainframe or minicomputers, placing the ability to process that data in the hands of very few technicians in each organization. This year, 2000, the microcomputer is celebrating its 25th anniversary. As the microcomputer has developed, computing power has been moved into the hands of each individual in the organization. Today's microcomputers have more computing power than a mainframe computer in the early 1980s.

As the focus of technology shifted to the microcomputer, the need for networking the equipment to allow exchange of data developed. The first step in networking was to build small, local networks within organizations. Through the introduction of the Internet in the early 1970s, the smaller organizational networks are now connected to networks throughout the world. It is difficult to determine exactly how many people are connected to the Internet, but recent estimates place the number near 250 million. Networking is now a fact-of-life and is one of the key factors driving organizational decisions about information technology strategic plans.

As networking and communications technologies advanced, and the physical size of microcomputers became smaller, the laptop was developed. This product, too, has had a dramatic impact on the way in which people work and the means through which they access and share information. Advances in wireless communications technology, coupled

with the portability of the laptop, means that individuals can now connect to the Internet—and thereby, share data— from virtually anywhere in the world.

The future of technology is probably unpredictable, except by a few in the technology industry. But we can predict an increasing technological ability to share current information, continual changes in the computer architecture, resulting in faster, smaller and technologically better equipment, and an increasing dependence on the Internet and global communications.

## 3. Technology Infrastructure at the Pan American Health Organization

### 3.1 *Hardware*

As in other large organizations, PAHO's introduction to computers began with the mainframe. In 1969, the mainframe was installed with one terminal; it hosted three applications (mortality statistics, accounting, and payroll). Today there are nearly 300 mainframe users and 30 custom-developed applications. Many of PAHO's corporate administrative applications as well as its database of mortality statistics are run on the mainframe. The mainframe is located in headquarters and, historically, access to the applications have been limited to staff assigned in Washington. With Internet technology, field offices are now able to access financial data that has been extracted from the mainframe applications for their use.

Microcomputers were first introduced in PAHO in 1982. In that year, about 10 were installed in the field offices. By 1990 the number of desktop computers had increased to 1,000. Today, nearly 2,500 desktop computers are installed in PAHO, two-thirds of them in field offices. Attached either to the individual computers or to the network, for shared use, are approximately 1,000 printers. In support of PAHO's travelers or those working offsite, laptop computers are also available.

The PAHO network is comprised of a series of local-area-networks (LANs), one located in each PAHO site, which are then connected together through telecommunications into a wide-area-network (WAN). PAHO's WAN is comprised of 113 servers (computers that host software applications and databases), wiring, and network switches. Network switches are used to route the 'traffic' (e-mails, data transmissions) to the proper location within the network.

### 3.2 *Software*

In order to function in a meaningful fashion, *operating system software* resides on every piece of equipment in the network. This software may be quite simple, such as the

two software products needed for the network switches, or very complex as for the more than 25 products needed just to operate the IBM mainframe.

Installed on the servers, desktop computers, laptops, and mainframe are *software applications*. The servers host applications for project planning and execution, e-mail, statistical analysis, personnel administration, correspondence tracking, connection to the Internet, remote access for travelers, and security functions. For field offices, the server also hosts the Office Management Information System (OMIS), used for program planning, budgeting, accounting, payments, procurement, and inventory control.

On the PAHO standard desktop or laptop, nearly 75 products are used for word processing, e-mail, spreadsheets, presentations, connection to the PAHO network, virus detection, or the behind-the-scenes PC management. Most PAHO applications on the mainframe are very large and complex, such as the central accounting, budgeting, payroll, procurement, and mortality database systems.

### 3.3 *Administration of Information Technology Resources*

A central IT support unit, located in headquarters, maintains the corporate computing infrastructure of the Organization, recommends appropriate information technology strategies to PAHO management both in headquarters and field offices, develops and maintains all corporate software applications and communications systems, and provide support to the users of the PAHO systems and technology. Each field office has a small IT staff to provide similar support to that office.

The equipment, wiring, software products, corporate applications, and staff resources to support the network represent a significant investment in information technology at PAHO. That investment is protected through policies and procedures that ensure its physical security, the security of the data, standards for software development or hardware purchases, maintenance of the products, and prudent planning for the use of future resource allocations.

### 4. Major Information Technology Initiatives and Objectives in the 2000-2001 Biennium

### 4.1 *Meaningful, Easily Accessible Information*

Establishment of a stable network and comprehensive applications has allowed PAHO to collect data needed for both internal management and execution of the Organization's technical programs. The connection of all PAHO offices to the Internet

has, at the same time, set the stage for sharing information both within the PAHO structure and with external partners in global health.

While maintaining the viability of the network and applications, the Organization must now focus on taking the data collected and making it available to the decision makers in a meaningful and timely manner. Toward this goal, there are several projects that must be undertaken during the 2000-2001 biennium.

- Replacement of the Mortality and Population Database

  Analyzing health information is a necessary first step for identifying and quantifying inequalities in health. PAHO and WHO are mandated with reporting mortality statistics, one of the key indicators upon which the Region's decision-makers analyze health inequalities and, on that basis, frame policies for achieving equity. Mortality data is the most reliable indicator and of key importance in the Americas. It is the only indicator that has been maintained in PAHO across many years and many different International Classifications of Diseases (ICDs 7, 8, and 9). Two-thirds of the mortality data reported by WHO are provided by PAHO.

  In its current form, the database is more than 15 years old. It is a large, complex system and does not support the recently adopted ICD 10. The current system also allows collection of data only at the aggregate level and it is important to begin collecting data at a more detailed level in order to further analyze the effects and distribution of specific indicators. Finally, the current system is designed in outdated software and does not easily lend itself to exchange of data with other health statistic databases. The system must be reengineered before the year 2000 mortality statistics are submitted to PAHO in 2001.

- Completion of the AMPES/OMIS Project

  The Technical Cooperation Planning, Programming and Evaluation System (AMPES) is used throughout PAHO for program planning, monitoring and evaluation. The Office Management Information System (OMIS) is used in the field offices for administrative functions, such as accounting, procurement, payments, contracting, and inventory control. These systems were implemented in 1988 and 1989, respectively.

  A project is well underway to re-engineer the existing DOS-based applications into an integrated MS Windows application. The systems are being redeveloped to replace old programming code that is difficult to maintain, to update computer

software that is not compatible with current technology, and to include functions in the system that support new or revised PAHO programmatic requirements.

The new AMPES software will be implemented in headquarters in 2000. Both AMPES and OMIS will be implemented in all field offices during 2001.

- Implementation of the Data Warehouse

The data warehouse will be a collection of select information from the financial, budgetary, and programmatic planning and evaluation systems, presented in executive level format (graphs, charts, and summary information that can be further detailed and analyzed as needed). The database containing financial and budgetary information has been developed. The software must now be installed and the users trained. The program planning and evaluation data will be added and linked to the financial data upon implementation of AMPES in this biennium.

- Replacement of Other Corporate Systems

Seventeen of PAHO's 32 corporate systems are over three years old—and those older systems average 13.6 years of age. Mentioned above, are the plans for replacement of the AMPES, OMIS and the Mortality and Population Database. During this biennium or early in the next biennium, cost/benefit analyses must be undertaken to determine whether (or when) to replace the payroll system (24 years old), the budget system (18 years old) or the staff health insurance system (14 years old) and whether to upgrade the accounting and procurement systems (each 8 years old). The replacement or upgrade of these larger, more complex systems are costly and have significant budget implications.

### 4.2 *Improve Network and Information Security*

Access to the Internet, while necessary for communication both within PAHO and with partners around the globe, has opened the potential for inappropriate access to the PAHO network. Protection of the network from potentially harmful computer viruses or other malicious activity is critical. Recovery from damage caused by malicious acts against one's network can often cost more than preventing such access in the first place. Also, to be a responsible partner in the global network, one must be able to trace the activities of unauthorized access (hackers) and help prevent further destructive action of those same individuals. PAHO has a minimal level of protection on their network at this time and has experienced some virus and hacker activity. Measures to increase security and strengthen the network management capability must be included in the IT strategic plan for this biennium.

### 4.3    *Compatibility and Technological Viability*

The hardware and software of any network must be upgraded periodically in order to be compatible with other organizations and to maintain products that continue to be supported by the technology industry. Every organization must decide how frequently to upgrade—whether to stay on the cutting edge or to retain some level of obsolescence and upgrade less frequently. Each component of the network has a depreciation life cycle. It is the practice at PAHO to replace equipment and software only as needed; however, for planning purposes the following replacement cycles are used: 3 years for desktop computers and laptops, 3-4 years for desktop and server software, 4-5 years for servers, 8 years for network wiring, 10-12 years for the mainframe. In each biennium, therefore, some portion of the IT budget must be dedicated to replacement of obsolete components of the network.

During this biennium, it is likely that PAHO will need to upgrade the network operating system to a newer architecture, possibly Windows 2000 (or "NT"). This upgrade would require changing the operating system software on all servers, desktop computers, and laptops. The plan is to delay this upgrade as long as possible, but probably no later than 2001. At that point in time, the operating system software in PAHO would be 4-5 years old and replacement would seem appropriate within typical industry lifecycle standards. The cost of such a replacement is, in today's dollars, nearly $2 million.

The use of many software products in PAHO's network legally requires us to pay an annual licensing fee. The budget for maintenance of the Organization's infrastructure must, therefore, include the annual renewal of those licenses. The total biennial cost for software licensing is just over $1 million.

Increased access to the Internet also allows PAHO to exchange data within the Organization as well as with the World Health Organization, ministries of health, and other global partners in health. As data becomes more readily available throughout the world and the volume in data transmissions increases, the size and capabilities of those data communications lines must be expanded. Future costs will likely include expansion in the size of PAHO's data communication lines.

### 5.    Meeting the Challenges of the Future

Many issues influence PAHO's decisions about the standards for hardware and software products, the timing of upgrading to new technology, the software application development projects to undertake and the staffing requirements to support the Organization's IT program. Some of those issues are internal to the Organization, such as

funding, staff availability, the frequency with which we upgrade the network components, but many are the result of the technology industry's regulations or actions.

While demand for keeping pace with changing technology or for new and improved software has increased, the PAHO resources that have been devoted to these areas have actually declined. Clearly, we must make cost effective decisions when selecting the information technology initiatives to undertake and determining the timing of those initiatives. One way to guide and monitor effective use of resources is through strategic planning. In an industry as rapidly changing as information technology, long-range planning is difficult, at best. But shorter, 2-3 year plans—certainly, for the larger IT projects—will be used to guide effective use of PAHO's IT resources. Through strategic IT planning, PAHO also ensures that a corporate-wide approach is taken with respect to information technology initiatives. This approach allows setting priorities throughout the Organization for new initiatives, minimizes duplication of IT efforts, and ensures that overlapping IT initiatives are well coordinated. The goal is to use our limited resources wisely.

One barrier to spending IT resources in the most effective way possible has been the need to force the timing of technological initiatives into the biennial funding structure. If sufficient funds are available in one biennium to procure software for a major upgrade project, for example, and it appears as though the funds may not be available in the next biennium, the decision may be made to go ahead with the procurement. The Organization may or may not be ready to deploy that software at the time of procurement. Even a few months later, when the timing for the upgrade is appropriate, that software release may already be obsolete. Sometimes, buying too soon can cost the Organization more in the long run. As indicated from the IT projects or operating costs described throughout this document, there will periodically be large "peaks" in the costs of operating PAHO's IT program. The overall costs for the IT program average out to approximately $5-6 million per year for the foreseeable future. The cost effectiveness of using PAHO's resources for information technology will be enhanced if a means could be found to remove the need to force the "peaks" into biennial funding cycles.

In a July 1993 resolution of the 111th Session of the Executive Committee, a Capital Equipment Fund was established for replacement or updating of electronic and computer equipment and for major software purchases, such as new personnel and payroll systems. The ceiling on that fund was established at $5.6 million. PAHO proposes to use that fund as designated and replenish the fund to the extent possible to cover the significant ongoing costs of maintaining the information technology infrastructure.

The technology infrastructure of any organization is, today, a cost of doing business. It is an investment—not just in assets, but in staff productivity and effectiveness in the use of information to meet the Organization's goals. PAHO has traditionally been a leader in providing information about the health status of the populations of the Americas. One critical component to maintaining that leadership and remaining a strong partner in meeting the goals of improved health in the Americas, will be the continued commitment to a viable, stable technology infrastructure.

*Cardinal*