Philippines

"Asia's Knowledge Center"

I.T. Action Agenda for the 21st Century

Republic of the Philippines
NATIONAL INFORMATION TECHNOLOGY COUNCIL
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Republic of the Philippines
National Information Technology Council

PREFACE

IT21 ACTION AGENDA FOR THE 21ST CENTURY

This National Information Technology Plan for the 21st Century, or IT21, documents our common vision and presents our nation's broad strategy to spur our country to global competitiveness through information technology. It sets down specific time frames for achieving these goals:

> *By the turn of the 21st century, the Philippines will have laid the infrastructure for every business, every agency of government, every school, and every home in the Philippines to have access to information technology.*

> *By the year 2005, IT use will be pervasive in daily life. Philippine companies will be producing competitive IT products for world markets.*

> *Within the first decade of the 21st Century, the Philippines will be a Knowledge Center in the Asia-Pacific: the leader in IT education, in IT-*

assisted training, and in the application of information and knowledge to business, professional services, and the arts.

This document benefited from a study undertaken by a team of international and local experts organized by the National Information Technology Council (NITC) and the United Nations Industrial Development Organization (UNIDO), with funding assistance from the United Nations Development Program (UNDP) and the national government. Over a period of about six (6) months, the team consulted with industry leaders, and various government officials to define the issues and recommend specific measures needed in meeting the goals that were set for the I.T. sector, taking current international experience and the state of I.T. into account.

The team's recommendations were summarized in a set of technical papers, which provided the major basis for this document. The draft of the IT21 document was reviewed and approved with some modifications and presented to the Legislative and Executive Development Council (LEDAC), and later during the same day last October 28, 1997, was again presented to and approved by a joint meeting of the Cabinet and the National Economic and Development Authority (NEDA) Board chaired by the President.

Soon after, the President met with the heads of leading global IT companies to forge strategic alliances in implementing specific projects identified in IT21. The President also issued on November 7, 1997 Administrative Order No. 332 on the RPWEB, which directs government agencies to connect to the Internet.

These events just emphasize the impetus being given to IT21 from the highest levels of public office in the land. Urgent tasks lie ahead for those who will follow.

- A number of policy issues in telecommunications and the establishment of the Philippine Information Infrastructure have been resolved, but there are still pending issues that must be addressed in "technology-neutral" ways.
- We have started capitalizing on global opportunities for solutions to the "millennium bug" problem and other I.T.-related services, but we still lack the critical mass of trained manpower to take a sizable share in the world market.
- Government agencies have increased their use of the Internet, but regular users of the Internet number only about one-tenth of one percent of the total Philippine population.
- Many Philippine educational institutions are just starting to experiment with the use of I.T. in education.
- We still need to gear up our science and technology community for R&D activities in the field of information technology.
- We still need to have IT21 internalized by all the relevant actors in the country.

It is therefore hoped that this document will serve as a continuing framework to guide the directions for I.T. in the country over the next 10-25 years. Above all, however, our success will depend on the total commitment and support of every one, of every sector -- to build up the momentum towards realizing our nation's vision in IT21: the transformation of the Philippines as a Knowledge Center in Asia in the 21st century.

CONTENTS

PREFACE

Part 1

Our Vision and Goal

The international community now sees the Philippines as an emerging economy that bears watching. The country has proved resilient in containing both domestic and external shocks with proper monetary policies and fiscal management. Reforms that brought about liberalization, deregulation, and privatization have significantly restructured industries towards greater efficiency. The present administration has built a solid foundation from which the Philippines can be propelled into the 21st century as a competitive and vibrant economy. The challenge to all Filipinos is to nurture and build on these gains and to ensure that their distribution will be as broad-based as possible.

These positive developments in the economy have contributed to the overall bullishness in the Philippine I.T. industry today. Indeed, there is a lot of gold to be mined in the Philippine I.T. landscape. The country can build its capability in the design and manufacture of large-scale integrated circuits and microprocessors and of microprocessor based process monitoring and control. Software design, along with information and data services, has become areas where the country has established certain advantages.   Developments in telecommunications technology offer new opportunities for the country's professionals (e.g. medical practitioners, engineers, etc.) to engage in *distance professional services*—where the presence of the professional is not required to provide such services. Knowledge-based industries are an area where the country can develop a competitive edge.

With this view, the Philippines has adopted IT21 as its vision to guide I.T. development in the country over the next 7-15 years. Its overall goal: to transform the Philippines into a Knowledge Center in Asia.

Our Vision: IT21

By the turn of the 21st century, the Philippines will have laid the infrastructure for every business, every agency of government, every school, and every home in the Philippines to have access to information technology.

By the year 2005, I.T. use will be pervasive in daily life. Philippine companies will be producing competitive I.T. products for world markets.

Within the first decade of the 21st Century, the Philippines will be a Knowledge Center in the Asia-Pacific: the leader in I.T. education, in I.T.-assisted training, and in the application of information and knowledge to business, professional services, and the arts.

Our Goal: the Philippines as Knowledge Center of Asia

In the State of the Nation Address of his final year in office, President Fidel V. Ramos spoke before the Third Session of the Tenth Congress of the Republic of the Philippines. He talked about the national pole-vaulting agenda, and implicitly enunciated the goals of IT21.

Telecommunications

... we should be accelerating the development of our information infrastructure.... If we get these things done, the distances separating our 7,100 islands will compress dramatically in the mind - as we build virtual bridges over the waters, across the air and into cyber-space.

Telecommunications will provide the infrastructure for interconnection and networking throughout the Philippine archipelago.

Industry

... we aim to turn the Philippines into an Asian hub of software development and training.

Private industry will adopt I.T. solutions for competitiveness and develop a global niche for Philippine I.T. products and services.

Government

We must improve government's capacity and efficiency across the board - in its every aspect and from top to bottom. The bureaucracy we must further professionalize and local government units we must begin to use as strategic partners in development.

Government will adopt "best practice" I.T. in governance and spur the growth of the Philippine I.T. industry by efficient outsourcing for public projects.

Education

We must make more intensive investments in ... our ``dual-training" systems, ``remote" educational institutions and ``open" universities.

We must make our schools not only communities of learners - where our children learn to read, write, compute. We must make them schools of the future - which nurture young Filipinos to become responsible citizens and enlightened leaders of our country.

Public and private education and training institutions will adopt I.T. in education and develop a critical mass of I.T. professionals and an I.T.-literate workforce

Research and Development

We must build in this country the constellation of skills - the education, research and development, the work ethic, the entire infrastructure of knowledge - that will enable us to develop technological leadership.

Local R&D will upgrade available I.T. resources through focused technology sourcing, adaptation, and dissemination.

Support Structures

We must work hard to win our place in the world - because the world will not stop for those who stand idly by on the roadside of development.

The next 10-15 years will be crucial .... We must learn to plan and prepare .... We must learn to look to what the world - the region - and the Philippines - would be like ... over the next 10-15 years.

The policies, programs, institutions and general culture that will bring about our goal of becoming a knowledge center in Asia will be provided through the coordination and collaboration of all the stakeholders in the development of I.T. in the Philippines.

Realizing our goal will require close cooperation between government at all levels, with local and international business, the academic and science and technology communities, civil society, and international institutions.

Part 2

Situating I.T. in the Philippines

Information Technology or I.T. is the collective term for the various technologies involved in processing and transmitting information, which include computing, multimedia, telecommunications, microelectronics, and their interdependencies. Also called "informatics" or "telematics", the term I.T. now more often refers to the convergence of various information-based, broadcast, and mass media communication technologies.

The Global Picture

The worldwide I.T. and electronics industry is centered around computers, communications, software and related services. The I.T. and related electronics markets represent the largest non-agricultural economic activity, and the fastest-growing business, in the world. Worldwide spending on I.T. products and services will rise 12 percent to reach $683 billion in 1997. PC shipments in the US are expected to grow 15 percent, with annual growth rates over the next five years of 11 percent.

The Internet explosion and the growing home market are boosting I.T. sales. There were 31 million users connected to the Internet by end of 1996, and more than 150 million are expected by the year 2000. The number of servers will grow to five million by the year 2000. The bulk of these users and networks will be in Asia.

I.T. is increasingly a concern of multilateral policy agreements, particularly within the General Agreement on Trade in Services (GATS) within the World Trade Organization (WTO) and the Framework Agreement within the ASEAN for expanding intra-regional trade in services. I.T. permeated the various trade and investment liberalization and facilitation initiatives, as well as economic and technical cooperation, within Asia-Pacific Economic Cooperation during the Manila-Subic ministerial and leaders' meetings in 1996. Policy initiatives in electronic commerce are being fast-tracked in the United States and the European Union.

Developments in Southeast Asia

The market for PCs in the Asia-Pacific region grew by 32 percent in 1996, with a particular strong showing in notebooks and server sales. The growth of the Asia-Pacific PC market is projected to continue over the next five years, with a combined annual growth rate of 20 percent. In almost all the Southeast Asian nations, I.T. and telecommunications are increasingly being used as critical instruments of national and regional development. I.T.-related plans and policies are being used as means for enhancing competitiveness and for realizing international cooperation and coherence within the region.

Table 1. Asia-Pacific PC Shipments by country of origin

COUNTRY	1996	1995	GROWTH
Japan			

8,099,200

5,822,000

39.1

China

2,108,240

1,518,002

38.9

Korea

1,973,943

1,514,032

30.4

Australia

1,393,939

1,214,740

14.8

Taiwan

525,008

421,385

24.6

India

447,132

350,386

27.6

Indonesia

420,846

332,046

26.7

Hong Kong

342,513

309,148

10.8

Thailand

321,782

269,505

19.4

Malaysia

328,197

254,456

29.0

Singapore

306,236

250,508

22.2

New Zealand

195,702

203,337

-3.8

Philippines

187,754

138,018

36.0

Rest of Asia Pacific

329,999

254,001

29.9

TOTAL

16,980,490

12,851,564

32.1

Source: IDC

The Philippine Situation

The principal strengths of the Philippine I.T. industry include a well-educated, price-competitive labor force, English proficiency, growing track record of successful I.T. work, fast-growing telecom infrastructure, government interest in the industry, less regulation than some neighbors, good capabilities for dealing with foreign partners, and strong entrepreneurship. Its weaknesses include a scarcity of middle to high-end I.T. personnel trained and experienced enough for international projects, insufficient cooperation within the industry, weak IPR enforcement, difficulties marketing the nation and the industry, capital cost and scarcity, small-scale nature of entrepreneurship, small domestic market, insufficient I.T. education, and insufficient institutional cooperation and planning.

Yet, there are missing elements for integrated I.T. diffusion in the Philippines, compared to other countries:

- improved access to I.T. technology and know-how from other countries across industries
- preferential treatment of advanced local users in learning from foreign firms
- more integrated approaches to national strategies for I.T. diffusion -- e.g., pace setting activities in cost-sharing, government-industry partnerships, and I.T. consultancies
- user-oriented I.T. strategy to encourage building a critical mass of local I.T. firms
- support to creating world-class managerial skills in information management and organization

In spite of these shortcomings, the outlook on the Philippine I.T. sector remains bullish, largely because of the recent sustained growth of the Philippine economy. Increased I.T. spending and revenues are projected as more companies begin to implement cutting-edge technologies such as Intranets and data warehousing. A survey among IS managers revealed plans of increasing their I.T. budgets from 10 to 50 percent in 1997. The Internet, with its potential to change the way business is done, .is a major source of optimism among vendors. The continuing liberalization of key industries is giving a big boost to I.T. projects, increasing demand and competition particularly from multinational companies. Despite keener competition, the country's Top 350 I.T. companies posted net sales of P89 billion in 1995, up by 33 percent from 1994. Reported net sales of the Top 200 I.T. companies in the Philippines reached P135 billion in 1996.

Table 2. Net Sales of the Top 350 I.T. companies, By sector, 1994-95

SECTOR	1995	1994	% CHANGE
Hardware	7,800,458	5,559,357	40
Software	1,401,254	838,086	67
Computer Peripherals	15,274,284	10,134,188	51
Computer Accessories and Supplies	3,245,984	1,784,566	82
Computer Services	3,287,344	2,431,626	35
Networking/Online Services	39,025	19,206	

103

Other Office/Business Machines

2,527,670

1,887,910

34

Telecommunications Services

39,998,002

32,139,721

24

Telecommunication Equipment and Accessories

15,579,127

12,233,523

27

TOTAL

89,153,148

67,028,523

33

Source: I.T. Resource 1996-1997

Investments continue to pour in. Intel has been investing between $300 and $400 million in local manufacturing facilities over the last 2-3 years. Seagate is expanding its recording head manufacturing facility in the Philippines, with 1996 investments of nearly $300 million. Fujitsu inaugurated a hard disk manufacturing plant in Canlubang, with total investments expected to hit $300 million. Apple Computers opened a full subsidiary. NEC will build a board wiring plant in Laguna, Acer is building additional facilities in Subic, and Cypress Semiconductor is investing $110 million in a new assembly and test plant in the country. In I.T. services, James Martin doubled in size, NCR SW developed bank branch tellering applications, and Platinum Technology established a local office to increase technology support.

Globally, competition in electronics has shifted away from final assemblers and vertical control to "open-but-owned" systems, with standard owners going after a growing installed base of customers. Turnkey contractors have been vertically integrating to process R&D, design for manufacturability, product-specific process development and documentation, various forms of testing, final product assembly, final packaging, software loading and document duplication, and direct shipping to distribution. The fastest-growing contractors have specialized in newer processes such as surface mount technology (SMT) which drive product miniaturization and performance forward. Increased outsourcing has created an unprecedented boom in

the revenues of contract manufacturers. Over the 1992-95 period, annual revenue growth was 46 percent, and even larger growth is foreseen. These are opportunities yet to be tapped by the Philippines.

Telecommunications

The deregulation of the country's telecommunications industry paved the way for a hefty buildup in investments in this sector, estimated to total P130 billion over the next three years. The total number of main telephone lines in the country climbed from only 785,000 in 1993 to 3.353 million as of end 1996. Expansion is projected to remain strong at 72 percent in 1997 and decelerate to 21 percent in 1998 when the telcos will have fulfilled their commitments in terms of telephone lines they have to put up.

Table 3. Number of Telephone Lines Installed and Telephone Density Index, 1989-1998

Year	No. of Main Lines	Telephone Density (per 100 people)
1989	506,527	0.86
1990	549,159	0.91
1991	583,594	0.95
1992	740,033	1.17
1993	784,719	1.21
1994		

1,109,652		
	1.67	
	1995	
1,409,639		
	2.01	
	1996	
3,352,842		
	4.66	
	1997	
6,108,006		
	8.31	
	1998	
7,347,664		
	9.78	

Note: 1996 figure is based on carriers' reports and population of 71,899,000. Subsequent figures are based on Carriers' submitted rollout plans.

Source: National Telecommunications Commission

Telephone density per 100 people improved from 1.21 in 1993 to 4.66 in 1996. The number of public calling centers increased from 171 in 1992 to 728 in 1997. By 1998, a telephone density of 9.78. is expected. The percentage of all cities / municipalities served nationwide climbed from 21 percent in 1992 to 27 percent in 1996. By 1998, about 87 percent of all regions will be serviced by telephones.

Agila II was launched in August 1997, with a reach covering all Southeast Asian countries and some parts of China and Japan. It further expands local telecommunications and broadcast infrastructure without depending on foreign-owned satellite facilities.

Table 4. Comparative Telephone Densities (Telephones per 100 persons): Philippines and Other Asian Countries

Country
1992
1993

1994

1995

1996

Philippines

1.17

1.21

1.67

2.01

5.20

Indonesia

0.98

1.18

1.81

1.13

1.59

Korea

41.80

45.90

42.26

39.70

41.50

Malaysia

11.24

12.65

11.20

15.80

15.80

	Thailand
	3.10
	3.73
	4.50
	5.93
	7.41

Four telecommunication bills were pending in Congress:

- **Proposed Reorganization of the National Telecommunications Commission (NTC)**
- **Cable Television Rationalization Bill**
- **Anti-Telecom Fraud Bill**
- **Arbitrary Resistance to Interconnection which seeks to criminalize the refusal of a company to interconnect**

The number of Philippine ISPs increased from 19 in 1995 to 88 in 1996, and to over 160 by the end of 1997. More ISPs are expanding their services to include content provision as well. WebQuest launched the Internet aXess card to provide telephone services over the Internet. The first Philippine Internet Exchange (PhIX) was launched in July 1997. PhIX is a network access point that allows ISPs to exchange local Internet traffic within the Philippines without having to connect to host servers overseas. The PhIX was established by PLDT and interconnects Infocom, Iphil, Mozcom, Virtualink and Worldtel. The number of regular Internet users was estimated at 84,500 in 1997.

Table 5. Telephone Services Across Regions, 1996

% of Cities/Municipalities Served

Region
1992
1996
1998
1
38
58

82

2

23

32

43

3

43

55

95

4

24

34

59

5

11

28

100

6

15

23

100

7

8

17

93

8

8

9

98

9

6

10

87

10

11

18

97

11

13

22

100

12

5

17

100

NCR

100

100

100

CAR

0

12

47

ARMM

0

2

68

TOTAL

21

27

83

ZOPAD

7

12

68

Source: NTC

Industry

The banking industry is one of the Philippine pioneers in I.T. use. Megalink operated the first shared network of automated teller machines (ATMs) and was the first switch company to undertake ISO 9000 certification. EDInet Philippines Inc., a company jointly owned by Ayala Corp. and Singapore Network Services Private Limited, is pioneering applications of electronic data interchange (EDI). Among other I.T. projects in banking:

- Philippine Dealing System (PDS), an electronic off-floor foreign exchange trading system that has been in place since August 1992
- Philippine Domestic Dollar Transfer System (PDDTS), a vehicle and electronic facility to handle and monitor bookkeeping claims to US dollars being traded among participating banks.
- Project Abstract Secure (PAS), a functional collaboration between the Bureau of Customs (BOC) and the BAP where an electronic system has been put in place to verify the proper payment of customs duties/taxes and to remit payments electronically through the banks.

The Philippine Stock Exchange set up an electronic trading system in 1994, and provided the investing public with access to market information during trading by using investor terminals located at the public galleries. An electronic link-up with the Securities and Exchange Commission started in 1996. A paperless trading system was introduced in 1997, with the settlement and clearing of transactions using certificates replaced by a book-entry system of transferring ownership for equities and lodging the certificates in a central repository. A clearing facility is being built to supplement the central depository.

The Philippine electronics industry is the country's major export winner. The industry is export-oriented, essentially engaged in assembly manufacturing and labor intensive

activities, dominated by multinational corporations (MNCs) such as Intel, Texas Instruments, Fujitsu, Matsushita, Toshiba and others.

The industry continues to post impressive growth in investments, export earnings and job generation. Over the last five years, the industry experienced an average yearly growth of 48 percent. Electronics industry exports reached $10.6 billion in 1996 and represented over half the value of all Philippine exports. DTI forecasts electronics exports to climb to $14 billion by 1997 and $18.55 billion by 1998. Total industry employment was 38,000 in 1985, increasing to 69,000 in 1990 and 160,000 in 1996. Semiconductor companies employ more than 60 percent of the industry's total workforce. Investments by the electronics industry have been increasing substantially, from P1.5 billion in 1991, to P5.97 billion in 1993, to P55.57 B in 1995. Some 300 electronics firms are registered with the Board of Investments.

Table 6. Export performance of the Electronics Industry

Year	Exports (US$B)	Growth rate (%)	Percent to RP Exports
1992	2.97	20	28
1993	3.78	27	33
1994	4.89	28	36
1995	7.55	55	

1996

10.61

40

52

Source: DTI

The software and services subsector has also been a consistent export winner, with export revenues reaching US $206 million in 1996, up by 51 percent from the US $125 million in 1995, which was a phenomenal increase from the $66 million in 1994. Target exports by year 2000 is US $300 million. Most of the country's software exporters only serve as subcontractors for bigger software producers in other countries such as the United States. Given the export statistics, Philippine market share is very minimal considering the size of the world market. Worldwide I.T. industry revenues topped $1 trillion in 1996, with the US reporting $747 Billion or three fourth of the worldwide I.T. revenues for 1996. The figures represent growth of 6.5 percent and 7.8 percent over 1995 figures, respectively. The world software market was reported at $253.9 billion in 1996, up by a tenth from $230.8 billion in 1995.

The "Year 2000" or "millennium bug" problem opened up opportunities for Filipino programmers. The TLRC Data Center was established inside the Clark Cyber City, in cooperation with a Canadian firm, to offer code conversion solutions. Many of the company's programmers came from nearby resettlement sites and were hired after a two-week training in code conversion. Government is also working with local software consortia to train 100,000 programmers.

Locally, the Philippine PC market was upbeat in 1996. A total of 187,768 units of PCs valued at $314.28 million were shipped to the country in 1996, a value that is 36 percent higher than that of 1995. PC growth will be driven by the entry of newer Intel processors into the country. The government sector will be a bigger market for PCs as it implements its computerization projects. Likewise the business and home markets will continue to buy more PCs as prices continue to decline. There will be a greater demand for branded computers as the price difference narrows down between clones and branded units. The Philippine market for LANs, printers and multi-user systems in 1996 also posted significant increases over their 1995 levels.

Government

Microcomputers constitute 99 percent of all computer systems used in the national government, with 142 PCs per national government agency being the average. Almost half of all PCs are found in government owned and controlled corporations (GOCCs).

Out of the 1.2 million government employees, only 0.3 percent are I.T. personnel. Others are mainly I.T. technicians (researchers, computer/data entry operators) and I.T. professionals (programmers, analysts, consultants), while 9 percent are I.T. managers. Since information systems planning was institutionalized in government in 1989, more and more agencies have started to plan and implement a computerization program. As of February 1996, 130 information system plans have been evaluated and endorsed by NCC to DBM.

There is a marked increase in the number of major computerization projects in government involving strategic and high–technology integrated solutions. Among them:

- **electronic declaration of import entries and automatic computation of duties and taxes at the Bureau of Customs, which has cut down the time for release of cargo to only 4 hours from 4-6 days**
- **computerized motor vehicle registration, decentralized production of driver license cards and vehicle plates, and a single ticketing office for traffic violations at the Land Transportation Office**
- **mobile passport issuance services at the Department of Foreign Affairs through provincial extension offices provided citizens with easier access to international travel documents**
- **claims processing at the Government Service Insurance System speeded up to 8 days from 60 days**
- **decentralization of Social Security System services through a central computer linking some 100 branches allowed easier full service access to members and their dependents**
- **computerized professional licensure examinations at the Professional Regulations Commission allowed examination results to be issued within 5 days instead of 7 months**
- **partial computerization of the civil registry at the National Statistics Office allowed many certificates of birth to be retrieved on the same day of application**
- **registration of securities at the Bureau of Treasury provided an electronic system for recording and certifying transactions in government securities**

Among other strategic networks that government put in place for cost-effective communication and information exchange were FINLINK at the Department of Finance to facilitate information sharing with its major bureaus and other government agencies; POWERNET at the Department of Energy; the LEDAC Network for the Legislative Executive Development Advisory Council; the National Statistics Office QuickStats; Economic Indicators Online (EIO) at the National Economic and Development Authority website; FINLINK, a financial information system linking the key financial and revenue institutions of the country; computerized voter's list with the Commission of Elections, tax computerization in the Bureau of Internal Revenue; computerized trade and industry information services at the Department of Trade and Industry; national crime information system at the Department of National Defense, entry and departure monitoring at the Bureau of Immigration, and the "cyber city" established by the Office of the President in Subic Bay to showcase I.T. applications in public services. Government is also getting wired. As of October 1997, there were over 100 government agencies connected to the Internet, with most of them having their own websites featuring information on their key programs and activities.

The government's budget for I.T. spending is increasing: the national government has an average annual operating budget on I.T. of P643 million. P7 billion worth of I.T. assets have been invested by the national government for the past five years; about P21 billion is expected to be invested in the next five years. An increasing number of local government units (LGUs) have started using I.T., especially for revenue-generating operations: business permits and licenses, tax administration, real property taxes, and the Civil Registry System. The Local Government Computerization Program (LGCP), the master plan for the use of I.T. in local area development has been completed.

Education

Quality and expertise continue to distinguish the Filipino I.T. professional.   Filipinos find it easy working on legacy applications as well as fourth generation languages. Over 3,000 Filipinos are adept with mainframes, and more than 5,000 are experienced in minicomputer operations. Filipino microcomputer professionals have experience with connectivity and data communications through Local Area Networks (LAN) and micro-mainframe links.

Computer schools and training centers continue to grow, adding to revenues in the services sector. In 1996, there were about 200 training centers offering short-term computer courses, while 30 colleges and universities offer degree programs in computer science and engineering. The number of computer schools, colleges and training centers increased to 357 in 1997. The Philippines is the second among Asian countries in terms of the largest number of training facilities for computer programming and computer-related courses.

I.T. enrollment is on the rise. The number of students who enrolled in I.T. courses during the school year 1995-96 rose 28 percent to reach 117,799 from 91,829 enrollees in the previous year. I.T. graduates numbered 14,944 in school year 1995-96, up by 29 percent from 11,598 reported in 1995. Of the total I.T. enrollment, 76.4 percent were enrolled in Computer Science, the most popular I.T. course. In terms of regional distribution, the NCR accounted for 42,178 of all I.T. students, followed by Central Visayas with 16,841 and the Southern Tagalog region with 11,081 enrollees.

A P375 million DECS Modernization Program is currently being implemented to upgrade student competency and educational management through computers. A Center for Education and Technology was established last June 1997, featuring a mini school of the future and a showroom. A program to computerize 97 SUCs and 168 private schools all over the country was launched in May 1997, with a P300 million budget for the acquisition of computer hardware, software and training. The use of I.T. to improve teaching, learning, and educational management in basic education was introduced through "Schools of the Future" equipped with multimedia facilities, with the first opened in Camarines Sur in April 1997.

There are about 8,000 libraries in the Philippines, broken down into 1,755 academic 566 public libraries, 5,516 school libraries, and 267 special libraries. Only about 500 use computers in their operations, with the latest trends being the use of CD-ROMs and linking to the Internet via an ISP. Seven libraries in the DOST-ESEP project have interconnected their catalogs and allow access through the Internet. At least seven other libraries outside the DOST-ESEP network have integrated and automated library systems, two of them using software developed in-house. There are at least 4 library networks (i.e., libraries which have grouped together for the purposes of information sharing) which are considering such interconnections. The National Library and the Philippine Library Association, Inc. are currently putting together a National Information Development Plan.

Research and Development

R&D expenditures, of which 60 percent comes from government, have remained very low. In 1992, R & D expenditures were estimated at P1.5 billion representing only 0.22 percent of GNP; newly industrializing countries spend 1.5 percent of their GNP on R&D.

The country does not have the critical mass of scientists and engineers required to industrialize. The current ratio of 155 scientists and engineers per million population is way below the UNESCO norm of 380 for industrializing countries. The country has very few R&D institutions of international caliber. Support to these institutions is being provided by the government with very minimal contribution from the private sector.

Most of the technologies being used in the country are imported. This is shown by the number of patents granted to foreigners. Of the 19,404 patents granted for the period 1985-1994, 14,164 or 73 percent are foreign owned. During the period 1979-1993, there were 1,504 technology transfer agreements (TTA) with foreign technology suppliers.

Presently, various electronic information networks are encouraging greater inter-action within the country's S&T community: the Science Academe and Research Network (SARNET) which aims to connect to the Net the 2,000 tertiary and secondary schools

all over the Philippines; the Science and Technology Education Network (STEDNET); and the Health R&D Information Network (HERDIN). DOST also put online the S&T Infoweb, an information service which provides a single interface between the Internet and the wealth of databases available from the agency.

Support Structures

In July 1994, President Fidel V. Ramos approved the National Information Technology Plan. The NITC was constituted to oversee the implementation of the Plan, now IT21, the country's blueprint for I.T. development.

The government, with the support of the private sector, successfully launched and completed the 1st nationwide search for I.T. excellence last year to encourage the development of world-class I.T. products and services. Just recently, the 2nd nationwide search was launched.

The Intellectual Property Rights Code, Republic Act No. 8293, seeks to impose stiffer penalties and fines for the manufacture, distribution and use of unlicensed software. It was passed into law on June 6, 1997, and takes effect on January 1, 1998.

The country supports the Information Technology Agreement (ITA) which seeks a multilateral elimination of tariffs on information technology by the year 2000. The Philippines has already reduced to 3 percent the duties on selected I.T. products under Executive Orders numbered 264 and 288 starting 1995 up to the year 2000. A uniform duty of 5 percent is targeted by the year 2004.

House Resolution 890, sponsored by Rep. Leandro B. Verceles, Jr., calls for the interconnection of local Internet service providers into one Internet exchange. This exchange, to be otherwise known as the RPWEB will electronically link up via the Internet the entire government organization. On November 7, 1997, the President issued Administrative Order No. 332 adopting and promulgating the RPWEB as the nucleus of the Philippine Information Infrastructure (PII) and directing all government agencies down to the local and field levels to inter-connect through the Internet.

Soon after the approval of IT21 on 28 October 1997, in a visit to the United States, President Ramos met with Microsoft Chairman Bill Gates and concluded four (4) Memoranda of Understanding (MOUs) where Microsoft agreed: to explore the possibility of cooperation in the area of I.T. core competency and information infrastructure development; to jointly undertake specific projects and activities described in IT21 such as the establishment of interconnected learning centers, as well as to explore such other cooperation possibilities as in the development of advanced software; to provide technical assistance in translating electronic commerce initiatives into technology applications; and to provide technical assistance, training and administrative support as may be agreed for the implementation of a software management and review program to sustain the software legalization process in government.

Also during the same US visit, the President witnessed the signing of an MOU between Oracle chairman and chief executive officer Lawrence Ellison and Asia Pacific Economic Cooperation (APEC) Foundation of the Philippines chairman Roberto R. Romulo, which makes the Philippines the first international participant to the US$50 million Oracle Academic Initiative (OAI). Under the agreement, Oracle will extent a US$1.5 million grant to the APEC Foundation to finance the training of young Filipinos in computer software applications, which gives a big boost to the government's I.T. skills and training program.

Part 3

Our Strategy and Action Agenda

The Philippines has adopted a strategy of *pole-vaulting* the economy into the 21st century and the Third Millennium. It brings forth a vision of a nation striving to become the best it can be: working faster, setting higher goals, making society and the economy stronger. The *pole-vaulting* strategy will double per capita income of Filipinos and achieve full NIC-hood for the Philippines by the year 2002. Inflation shall be brought down to an annual average of 3 percent, unemployment to 3-4 percent, and poverty incidence to 20 percent.

I.T. is an essential tool for this *pole-vaulting* strategy. It provides both the infrastructure for competitiveness, and a dynamic industry that will itself be globally competitive.

Phases of Our I.T. Development

I.T. in the Philippines will develop in phases.

The scattered gains made these past years shall be consolidated, and provided a new impetus. Access to information technology for all shall be achieved by the year 2000. The telecommunications roll-out program and the framework for the Philippine Information Infrastructure (PII) will be completed while the industry will be pump-primed by government outsourcing for public I.T. projects. The appropriate policy and institutional frameworks for effective cooperation between government and industry groupings will be put in place. Government will extend support to local industry for their marketing, financing, R&D, and manpower requirements as the latter seeks its global niches.

As I.T. activities become more focused on the nation's competencies and more pervasive throughout the archipelago, government will turn over the lead role in I.T. development to the private sector. By the year 2005, private business will have moved into its global product and service niches and built up the country's momentum towards sustained growth in these areas. Particular niches in education and training are expected. The efforts of private business will be supported by continuing high levels of growth in telecommunications, the diffusion of I.T. use throughout industry, and the effective use of I.T. in governance.

Within the first decade of the next century, IT21 will realize its vision of the Philippines as a Knowledge Center in Asia.

Our I.T. Development Strategy

IT21 relies on government and private industry playing lead roles in pushing forward I.T. use and I.T. production in the country.

The role of government as in Philippine I.T. development is defined as that of *enabler*, *lead user*, and *partner* of the private sector. As *enabler*, the government will provide the national information infrastructure and the policy, program and institutional environment that will encourage the growth of I.T. use and the I.T. industry in the country. As *lead user*, the government will implement leading edge I.T. applications and provide examples of "best practice" in the use of I.T. for the delivery of government services. As *partner* of the private sector, the government will undertake key I.T. projects for participation and implementation by business, the academe, the science and technology community, and civil society.

As private business is spurred by government actions, it will seek its global competitive niches and develop the Philippines as a highly competitive production platform for global electronics and I.T.-related industries in the Asia-Pacific. In the short-term, they must seize local and overseas market opportunities in solutions to the Year 2000 (Y2K) problem, popularly known as the "millennium bug", in Internet/intranet/WWW applications, and in outsourcing by the Philippine government for its I.T. development projects. Over the medium to long-term, the I.T. industry should develop strategic partnerships for turnkey production and the development of I.T.-assisted education materials — logical niches for Philippine industry. All throughout, they must collaborate closer among themselves and with other stakeholders in I.T. development in the Philippines to advocate for whatever policy, program and institutional reforms may be necessary, and to improve service delivery, marketing, and R&D through common efforts.

Those involved in telecommunications, education and R&D will each play their own supportive roles — telecommunications for the physical infrastructure, education for the adequate preparation of the labor force, the R&D community for developing local products and applications, and for adapting technology sourced overseas to Philippine conditions — as well as act in a broader capacity as government or private business.

All stakeholders, together, shall communicate and advocate about the importance of I.T. for Philippine development. They shall help foster an I.T. culture among all Filipinos.

Our Action Agenda

This summary listing of policies and programs is divided into the three phases of IT21. A more detailed listing is provided for the first phase, while indicative thrusts are given for the succeeding phases. This document will be continuously updated to keep pace with developments in markets and technology.

Phase I. Providing the Impetus

By the year 2000, the Philippines will have laid the infrastructure for every business, every agency of government, every school, and every home in the Philippines to have access to information technology.

A. Provide the Policy Environment

> 1. Adopt and implement policies to promote increased investments in I.T. and related electronics industries — e.g., through strategic partnerships, venture capital.

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Specific Actions

Time Frame

Lead Agency/Organization

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Promulgate administrative/legislative measures to promote wider private sector participation in venture capital financing to expand the capital base for I.T. R&D and other I.T.-related development ventures
1997 – 1998
DTI-BOI, DOF, PCCI

Adopt measures to promote strategic partnerships and alliances by local companies/institutions with leading international R&D institutions, technology providers, developers, and manufacturers
1997 – 1998
DTI-BOI, DFA, DOST, ITFP
Promote private sector investments in product- and location-specific I.T. projects
1997 – 1998
DTI-BOI, PEZA
Promote technological innovation and experimentation by creating new products, services and applications
1997 – 1998
DOST, DTI, ITFP-PSA
Focus R&D on high-value added I.T. products and services as well as on product creation/design and improvement in high growth sectors such as telecommunications, software development (information systems, common application packages, educational/courseware packages, multimedia applications, computer animation, promotional packages, public information, news materials, multimedia), telemedicine, e-commerce, etc.
1997 – 2005
DOST, DTI-BOI, PETEF, ITFP-PSA

2. Adopt more investor-friendly policies, systems and procedures in government.

Specific Actions

Time Frame

Lead Agency/Organization

Fast-track legislation/adoption of administrative measures to further liberalize foreign investment
1997 – 1998
DTI-BOI, DOF
Establish fast lane services for foreign investors/businessmen at ports of entry and when transacting business with government to create investor-friendly environment
1997 – 1998
DOTC, DTI, DOF
Organize task force on monitoring and public accountability aimed at making the administrative and policy environment for more conducive for investing and doing business in the Philippines
1997 – 1998
DTI

3. Implement Philippine commitments to international agreements that affect the I.T. sector favorably — e.g., the I.T. Agreement (ITA).

Specific Actions

Time Frame

Lead Agency/Organization

Implement Philippine commitment to the I.T. Agreement (ITA) based on the tariff phase-out schedule submitted in Geneva on 25 April 1997
1997 – 2000
DTI, ITFP

4. Adopt administrative measures to effectively enforce the laws on intellectual property rights (IPR), particularly as they affect I.T. products and services.

Specific Actions

Time Frame

Lead Agency/Organization

Adopt administrative measures to implement the intellectual property rights (IPR) law, particularly on I.T. products and services
1997 – 1998
DTI, ITFP

5. Rationalize and coordinate development of technoparks and cybercities throughout the country for greater complementarity in investments and infrastructure development.

Specific Actions

Time Frame

Lead Agency/Organization

Develop a master plan for technopark and cyber city development
1997 – 1999
DOTC, DOST, DTI
Network technoparks and cyber cities with educational and R&D institutions and organizations through high bandwidth telecommunications facilities
1997 – 2000
DOTC, DTI

B. Enhance the Physical Infrastructure

1. Accelerate universal access (i.e. making telecommunications services accessible and affordable to all) by completing telecommunications programs, especially in underserved areas.

Specific Actions

Time Frame

Lead Agency/Organization

Complete the roll-out programs of the telecommunications providers, especially in underserved areas
1997 – 1998
DOTC, NTC
Complete the Municipal Telephone Program
1997 – 1998
DOTC
Complete the establishment of the telecommunications backbone through the interconnectivity of the various Philippine telecommunications providers
1997 – 1998
DOTC

2. Fast-track the formulation and implementation of the Philippine Information Infrastructure (PII).

Specific Actions

Time Frame

Lead Agency/Organization

Accelerate government interconnectivity, information sharing, and communication via the Internet, with the RPWEB as the Philippine Intranet
1997 – 1998
DOTC, DOST, PMS
Organize task forces to identify, develop, and publish in the Internet sectoral/department/agency homepages to facilitate wider public access to information on key governmental policies, programs, and services
1997 – 1998
NCC
Adopt measures to encourage wider use and development of value-added services and networks (e.g. e-commerce, EDI, electronic libraries, telemedicine, private and government networks, ATMs, public information kiosks, life-long learning, law enforcement and public safety, interactive access to government services, electronic government, and the like)
1998 – 2000
DOTC, PCCI, ITFP

3. Intensify investment promotion in the telecommunications industry.

4. Formulate appropriate cyber laws in the use of networks, particularly the Internet, to ensure information security and network reliability.

5. Promote telecommuting/teleworking, particularly in software development and multimedia production.

Specific Actions

Time Frame

Lead Agency/Organization

Intensify investment promotion in the telecommunications industry
1997 – 1998
DTI-BOI, DOTC
Formulate appropriate cyber laws in the use of networks, particularly the Internet, to ensure information security and network reliability
1997 – 2000
DOTC, DOST
Promote telecommuting/teleworking, particularly in software development and multimedia production
1998
DOTC, ITFP-PSA, NCC

C. Develop the I.T. Manpower Base

1. Produce critical mass of I.T. professionals and I.T.-literate manpower, including competent I.T. educators and teachers at all levels.

Specific Actions

Time Frame

Lead Agency/Organization

Incorporate I.T. in the primary, secondary, and tertiary curricula
1997 – 2000
DECS, CHED, TESDA, DOST
Implement I.T.-based/computer-aided learning in basic education, including the pre-schools
1997 – 2000
DECS
Upgrade competencies of educational/training institutions with I.T.-based tools and programs
1997 – 2000
DOST, DECS, CHED
Re-orient engineering and other I.T.-related courseware toward greater responsiveness to industry needs
1997 – 2000
CHED, DTI, DOST, ITFP, PCCI
Develop instructional/learning materials especially in the sciences and engineering, math and technology
1997 – 2000
CHED, DECS, DOST

2. Designate from among I.T. training institutions, universities or colleges I.T. Centers of Excellence as a form of recognition and reward.

3. Organize a nationwide network of Core Competency Institutions in I.T., in partnership with local and international development institutions and business organizations.

4. Conduct continuing I.T. education for teachers/trainors, I.T. practitioners and workers.

5. Adopt dual-tech approach in I.T. education and training.

6. Establish high-quality distance education and learning.

7. Develop and implement life-long learning through the Internet.

Specific Actions

Time Frame

Lead Agency/Organization

Select/Designate from among I.T. training institutions, universities or colleges I.T. Centers of Excellence as a form of reward/recognition . Funding support for expanded training facilities and operations go with the award.
1997 – 2000
DOST, CHED, DECS, TESDA

Organize a nationwide network of Core Competency Institutions in I.T., in partnership with local and international development institutions and business organizations, with the Philippine Software Development Institute (PSDI) as the National Core Competency Center.
1997 – 2005
DOST, CHED, DFA, DTI
Conduct continuing I.T. education for teachers/trainors, I.T. practitioners and workers
1997 – 2000
CHED, DECS
Adopt dual-tech approach in I.T. education and training
1997 – 2005
CHED, DTI
Establish high-quality distance education and learning.
1997 – 2005
CHED, DECS
Develop and implement life-long learning through the Internet
1997 – 2005
DOST, DOTC

D. Pump-Prime I.T. Industry Development

1. Implement a government-wide computerization program, with emphasis on the development and deployment of front-line, mission-critical and common application information systems

Specific Actions

Time Frame

Lead Agency/Organization

Fast-track the development and implementation of information systems for government frontline services such as civil, vehicle, land registration, licensing, health and other social services, etc.
1997 – 2000
PMS, DBM, NCC
Develop and implement government mission critical information systems such as planning, budget management, execution and accountability, investment programming tax administration, revenue collection, justice administration, public safety, environment preservation, labor and employment, etc.
1998 – 2001
DBM, NCC, PMS
Standardize and deploy common application information systems in government, including the local government units
1997 – 2002
DBM, DILG, PMS, NCC

2. Implement the RPWEB to interconnect all government offices and units through any Internet Service Provider (ISP) in their area, to interconnect all ISPs through Internet exchanges.

3. Organize and monitor government and business response to the Year 2000 (Y2K) problem and opportunity.

4. Set up an I.T. Development Fund or other appropriate financing scheme for outsourcing information system development and deployment in government.

5. Promote technological innovation and experimentation by creating new products, services and applications, and developing value-added services and networks.

6. Provide appropriate financing support to allow active participation by the private sector in R&D and in the development and the incubation of new products and solutions.

7. Fast-track measures to streamline administrative processes and procedures in government procurement, budgeting, accounting, auditing, monitoring, reporting, etc.

Specific Actions

Time Frame

Lead Agency/Organization

Implement the RPWEB to (a) interconnect all government offices and units, including schools, colleges and universities, government corporations, as well as those at the local level, by authorizing the use of savings for Internet access, through any Internet service provider (ISP) in their area, to facilitate faster communication and data interchange in government; (2) interconnect all ISPs through Internet exchanges for greater connectivity among users in the country; and (3) speed up implementation of the telephone roll-out programs, particularly in unserved and underserved areas in the country
1997 – 1998
DOTC, DBM, PMS, NCC
Organize and monitor government and business response to the Year 2000 (Y2K) problem, including government sector participation in marketing programs/trade shows for Philippine developed software solutions
1997 – 1999
DTI, DOST, NCC
Set up an I.T. Development Fund or other appropriate financing scheme for outsourcing IS development and deployment for mission-critical and common application systems for government, including the local government units (e.g. procurement and accounting systems, financial management, budget allocation, execution, and reporting systems, personnel and payroll systems, tax mapping, land registration, valuation, and tax collection systems, civil, vehicle, and land registry systems, etc.)
1997 – 1998
DOST
Promote technological innovation and experimentation by creating new products, services and applications, and development of value-added services and networks (e.g. e-commerce, EDI, electronic libraries, private and government networks, ATMs, public information kiosks, and the like)
1997 – 2000
DOST, DTI, ITFP
Provide appropriate financing scheme and/or set up government fund to allow active participation by the private sector in R&D and in the development and incubation of new products and solutions to spur the widespread use of I.T. both in government and in business
1997 – 2000
DBM
Fast-track measures to streamline administrative processes and procedures in government procurement, budgeting, accounting, auditing, monitoring, reporting, etc.
1997 – 2000
DBM

E. Organize for Action: Institutional Reforms

1. Reorganize the NITC to broaden and strengthen private sector involvement in IT development activities.

2. Constitute NITC task forces to carry out specific IT21 programs/actions.

3. Organize a 50-member private sector Advisory Council to facilitate meaningful private sector participation in the implementation of IT21.

4. Strengthen the NCC to enable it to better carry out its primary mandate of promoting widespread use of I.T. in government.

5. Create a comprehensive database management, monitoring and benchmarking system for key I.T. indicators.

Specific Actions

Time Frame

Lead Agency/Organization

Organize the expanded/reorganized National Information Technology Council (or the National I.T. Board, NITB)
1997 – 1998
NITC
Constitute the NITC/NITB task forces to carry out specific IT21 programs/actions
1997 – 1998
NITC
Organize 50-member private sector Advisory Council to facilitate meaningful private sector participation in the implementation of the IT21.
1997 – 1998
NITC, PMS
Strengthen/Re-engineer the NCC as part of the newly created NITB to enable it to better carry out its primary mandate of promoting widespread use of I.T. in government through the formulation of appropriate I.T. policies and guidelines in the development of information systems and in acquiring I.T. resources; providing technical assistance; and providing I.T. training to government
1997 – 1998
NITC, DBM, PMS
Create comprehensive database on I.T. and set up monitoring and benchmarking system for key I.T. indicators
1997 – 1998
ITFP, DTI

F. Marketing the National I.T. Plan for the 21st Century (IT21)

1. Organize task forces to undertake a nationwide communication and advocacy program, including focused I.T. trade missions and international roadshows.

2. Develop, produce, and disseminate promotional materials on IT21 and the Philippine I.T. Action Agenda

3. Create a Philippine web site promoting IT21 the I.T. Action Agenda

Specific Actions

Time Frame

Lead Agency/Organization

Organize task forces to undertake a nationwide communication and advocacy program, as well as extensive and more focused I.T. trade missions and international road shows to promote the Philippines as I.T. investment destination and Knowledge Center for Asia in the 21st Century
1997 – 2000
NITC, DTI, DFA
Develop, produce, disseminate marketing/promotional materials on the IT21 and the I.T. Action Agenda
1997 – 1998
DTI, DFA
Create the Philippine IT21 web site
1997 – 1998
NITC

Phase II. Building Up Momentum

By the year 2005, I.T. use will be pervasive in daily life. Philippine companies will be producing competitive I.T. products for world markets.

- Diffuse I.T. use (preferably using Philippine solutions) throughout private industry
- Develop Philippine I.T. products and services for the local and global markets.
- Highlight "best practices" in public service delivery through the use of I.T. in governance
- Develop global competence in I.T. education and training
- Sustain high levels of growth in the telecommunications sector

Phase III. Realizing Our Vision

Within the first decade of the 21st century, the Philippines will be a Knowledge Center of the Asia-Pacific: the leader in I.T. education, in I.T.-assisted training, and in the application of information and knowledge to business, professional services, and the arts. More specifically, the following actions shall be undertaken:

- Develop a global niche for Philippine I.T. and knowledge products and services.
- Sustain I.T. innovation geared towards knowledge creation, management and dissemination.
- Push for higher levels of growth for the Philippine I.T. industry.
- Sustain the Philippine's role as Knowledge Center in Asia
- Highlight "best practices" in people empowerment through the use of I.T. in governance
- Attain the goal of universal access for telecommunications.

By the first quarter of the 21st century, the Philippines would have found its niche among the major knowledge centers of the world. It would be a major player in the design and development of significant knowledge-based products and services. Most if not all of government and private sector workplaces, homes and schools will have

access to the global information superhighway. Greater efficiency and productivity in communications among various sectors would have been achieved through the modernization of the country's telecommunications facilities and production tools. As what the President said during his State of the Nation Address (SONA) on the Third Session of the Tenth Congress on July 28, 1997,

> *This "survival-of-the-fittest" socio-economic and political order imposes severe penalties on the inefficient, the unskilled, the non-productive, the timid- and the disunited. But great opportunities await the intelligent, the self-disciplined, the innovative, and the daring.*
>
> *This is what we must resolve to make our beloved Philippines these next 10-15 years.*