Approaches for Systematic Planning of Development Projects
〈Information and Communication Technology〉
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Since FY2002, the Japan International Cooperation Agency (JICA) has referred to scheme types such as Project-Type Technical Cooperation, Individual Expert Team Dispatch, and Research Cooperation collectively as Technical Cooperation Projects. However, since there is a possibility of confusion with the original names of scheme types, this report also uses the current term Technical Cooperation Projects with reference to projects that were started prior to FY2001 for consistency.

Similarly, collaborative projects with other entities such as NGOs have been collectively referred to as JICA Partnership Programs since FY2002, and this report, therefore, uses the term Partnership Program with reference to projects that were started prior to FY2001 for consistency.

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Foreword

The Japan International Cooperation Agency (JICA) has been working toward the enhancement of its country-specific and issue-specific approaches by formulating JICA Country Programs, implementing Project Request Surveys, and drafting Thematic Guidelines. At present there are significant differences between countries in terms of progress levels or categorizations of development issues and cooperation programs. To improve further JICA Country Programs and deal with important development issues requires appropriate formulation of programs and projects based on a fundamental understanding of development issue and effective approaches toward them, while recognizing that situations and issues differ from country to country. JICA must clarify the priority areas for cooperation, based on both the actual conditions of each target country and a systematic approach for each development issue.

Therefore in FY2001 as a part of an effort to promote country-specific approaches by enhancing issue-specific approaches JICA conducted the study on "Approaches for Systematic Planning of Development Projects" in four issues: Basic Education, HIV/AIDS, Rural Development, and Promotion of Small and Medium Enterprises (SMEs). The study systematized these issues and specified the indicators to be used as references in planning, monitoring and evaluating JICA's activities. Furthermore, the study reviewed JICA's previous projects and summarized their trends, matters of concern and representative cases for each issue, based on Development Objectives Charts.

Due to a growing demand for systematization of other issues as well, a further study was carried out in FY2002. Four new development issues were taken up: Poverty Reduction, Trade and Investment Promotion, Higher Education, and Information and Communication Technology. The results of this study will be adopted in the JICA Thematic Guidelines and further developed by the Agency Thematic Network.

In conducting the study and preparing this report, a task force was set up, chaired by Mr. Hiroshi Kato, JICA Director of Planning and Coordination Division, Planning and Evaluation Department, and comprising JICA staff of related departments, JICA Senior Advisors, Associate Specialists, and external consultants. A considerable number of JICA staff members, as well as external experts, further contributed by offering valuable comments on the draft report. I would like to take this opportunity to acknowledge the efforts and contribution of all of these individuals.

Finally, it is my sincere hope that this report will prove a worthwhile step in the enhancement of issue-specific approaches.

September 2003

Morimasa Kanamaru
Managing Director
Institute for International Cooperation
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Terms and Abbreviations

Terms/Abbreviations	Remarks
Information and Communication Technology	
ADSL	Asymmetric Digital Subscriber Line: Technology that makes use of existing analog telephone lines, enabling high-speed data transmission by using the high frequencies that are not used for voice transmission. ADSL uses asymmetric transmission, where the downstream bandwidth (from the telephone exchange to the user) is greater than the upstream bandwidth (from the user to the telephone exchange).
AI	Artificial Intelligence: A term used to describe a computer that can understand human language; make deductions; learn; and solve problems. It is designed as a substitute for human intellectual work. The field of Artificial Intelligence includes expert systems, machine translation systems, natural language processing, automatic programming, image comprehension systems, speech recognition systems, and theory testing. Programming languages for Artificial Intelligence include Lisp and Prolog, among others.
APT	Asia-Pacific Telecommunity
AVU	African Virtual University: A distance education program started in 1997 and supported by the World Bank. The objective of this University is to provide African students with access to higher education courses in science, technology and business. In 2001 it became independent as an NPO and has been providing courses to 34 universities in 17 countries using videos and satellite communications with the support of several donors. (http://www.avu.org/)
Backbone	A high capacity trunk communication line linking together telecommunications carriers. Lines that link connection points within a provider*, or lines that link Providers* with other providers* or to an Internet exchange*.
Barrier-free	The elimination of things that exist as obstacles (barriers) that prevent those with disabilities from having a full life in society. Originally, the term strongly implied the elimination of physical barriers such as steps (at facilities), but the broader interpretation includes the elimination of all barriers, whether concrete or abstract, that prevent people with disabilities from participating in society.
Broadband	Generally broadband refers to high-speed Internet access services provided by ADSL* or Cable TV.
C Language	A programming language developed in the 1970s at AT&T Bell Laboratories by D. M. Ritchie. It is a standard development environment in UNIX*, and this is more efficient and enables control closer to systems than previous programming languages. Currently, there are various types of extended C languages, such as the object-oriented C++*.
C++	An enhanced version of C Language*, with object-oriented features added to the language processor. Developed by Bjarne Stroustrup. A key feature is that it is very easy to make the transition from the widely-used C Language, due to its complete upward compatibility. Of the C Language packages presently being sold for personal computer users, there are very few packages that are not compatible with C++.
C/S	Client/Server: An implementation strategy in which software and/or hardware systems are separated into two types interacting subsystems: the server which provides core processing, and the client which makes use of the services provided by the server. Compared to other approaches in which all functions are carried out by a single piece of software or hardware, in this approach each of the functions are simplified through layering of the system architecture, and making system development easier.
CAD/CAM	Computer-Aided Design/Computer Aided Manufacturing: CAD is the process of using a computer in industrial design, especially architecture, electronic circuits, etc. Line and graph representations play a central role in the graphical output of CAD applications. CAM is a manufacturing method that directly feeds the output data from CAD into numerically controlled machine tools.
Development Gateway	A comprehensive information site for sharing development-related knowledge and experiences, with the objective of reducing poverty and achieving sustainable development through the use of IT. (http://www.developmentgateway.org/)
Digital Divide	The gap that arises between those who are able to access information and communication technology and enjoy its benefits, and those who cannot.
Digital Opportunity	Good opportunities presented by information and communication technology. The IT Charter states that “Information and Communications Technology (IT) is one of the most potent forces in shaping the twenty-first century, and a means to enable people to realize their potential.”

Terms/Abbreviations	Remarks
Download	The process of transferring software or data from a network-connected server (computer) that is at a different location to the computer you are using. Similar to copying. When data is copied to a page on a server, such as publishing information on a website, it is known as uploading.
e-ASEAN	An initiative agreed upon in 2000 by ASEAN to promote the use of information and communication technology. Objectives include the liberalization of international trade and investment in the IT industry, development of an IT infrastructure, elimination of the digital divide*, development of legislation to facilitate e-commerce, and mutual recognition of digital signatures. One of the key characteristics of this initiative is that it aims to eliminate the digital divide in the region by having Member States that are capable of implementing the agreement by 2002 assist the less developed Member States.
e-Commerce	Business transactions where payment information is exchanged electronically on a computer network. In particular, this term is used to indicate all business that takes place through the Internet.
e-Government	Digitalization of various administrative services by applying digital technology to achieve a more efficient government. Can also refer to the organization itself.
e-Japan Strategy	An IT strategy formulated by the Headquarters for the Promotion of Advanced Information and Communications Society established by the Japanese Cabinet with the aim of making Japan the world's most advanced IT nation within five years. Emphasis is on establishing an ultra high-speed Internet network infrastructure, developing competition policies, spreading and promoting e-commerce, realizing an e-government, and reinforcing human resource development.
e-Learning	Training and education that proactively use information and communication technology and digital educational materials. In this type of educational system students can study whenever and wherever it is most convenient for them.
Fiber Optical Cable	Cables made from glass fibers, used as a transmission channel for optical communication. Compared to copper wires used for regular telephone lines, there is less signal degradation and a higher capacity of data can be transmitted at high speeds. Also less susceptible to events such as lightning.
GDLN	Global Development Learning Network: A distance learning network in order to share the knowledge and experiences of all who are involved in development, regardless of nationality or type of organization. Launched in 1997 with the support of the World Bank, as of 2003 there are more than 50 distance learning centers conducting training and dialogues. (http://www.gdln.org/)
GDN	Global Development Network: A network established to enable research and policy institutes in the field of development to share and use information. Launched in 1999 to support regional networks, with the World Bank playing a central role. In 2001, it became a nonprofit organization, and is operating with the support of several donors. (http://www.gdnet.org/)
GIS	Geographic Information System: A database that combines geographic map data with a variety of other attribute data. The various types of attribute data are stored according to their linkage to arbitrary points or finite surfaces on the topographical data thereby making it possible to search, convert, and analyze the stored data by geographical relevance. Many such databases are now being shared through the Internet.
GPS	Global Positioning System: A system that determines the position of a moving object. The location, direction of travel, and speed of a moving object are calculated using electromagnetic waves received from the 3 satellites (of 24 total) from which radio signals are most easily received. This system is commonly used in car navigation.
Hub	A device used to branch and relay cables on networks such as LANs. More devices can be connected to a network* by using hubs. By connecting hubs to the server at the center of the network, more personal computers and printers can be connected to the network*.
Internet	Generic term for a network which uses the TCP/IP transmission protocol to interconnect computers worldwide. It is called a network of networks because it is an interconnection of local area networks (LANs) and users all over the world who are on the Internet can communicate with each other.
Internet Exchange	A place where domestic Internet service providers are interconnected. Also called IX.
IP	Internet Protocol: An agreement (protocol*) for the transmission of data between hosts on the Internet*. In IP, data is broken down into small units called packets, which are then sent to their destination once they have each been assigned a tag called an IP address.
IPv6	Internet Protocol Version 6: The next-generation version of Internet Protocol*. The most significant change in IPv6 is that IP addresses have been changed to 128-bit numbers. This means that the number of computers that can be connected is approximately 1038. Other major changes in IPv6 include improved security by encrypting the packets themselves, and the addition of priority delivery of data.

Terms/Abbreviations	Remarks
IP Address	A specific sequence of numbers assigned to each computer on a network in accordance with IP*. IP is used in LANs Intranets as well as the greater Internet, so specific IP addresses assigned to computers that are directly connected to the Internet are called global IP addresses (to distinguish them from private . IP addresses on LANs or Intranets).
ISP	Internet Service Provider: A business that provides connection services to the Internet. Also called a provider*.
IT(ICT)	Information and Communication Technology
IT(ICT) Literacy	The ability to use information and communication technology.
IT Charter	The common name for the "Okinawa Charter on the Global Information Society," adopted at the Kyushu-Okinawa Summit in 2000. Given the recognition that the private sector plays a leading role in the IT industry, governments are working toward developing an appropriate environment, coordination for the establishment of international rules, protecting consumers, cyber-crime countermeasures, improving access, developing barrier-free technology, and providing opportunities for education and training to improve IT literacy. Also, in regard to developing countries, the charter emphasizes the importance of the governments of developing countries to take ownership in developing and implementing measures that meet their own needs and conditions.
InfoDev	The Information for Development Program: A financial assistance program managed by the World Bank, funded by donations from 20 governments and international institutions, and 4 companies in the private sector. With the objective of social and economic development by using IT (ICT), more than 120 projects have been supported in various fields including telecommunications, the Internet, education, the environment, and e-commerce. (http://www.infodev.org/)
JAVA	An object-oriented programming language that is platform* independent and therefore can be used under any operating system, such as Windows or Macintosh. Small applications written in JAVA (JAVA applets), can be automatically downloaded from a Web server and executed.
JICA-Net	A network system that establishes IT Centers in Japan and developing countries to carry out distance learning and remote conferencing. It enables simultaneous connection of multiple points and can also be connected and coordinated with the GDLN of the World Bank. As of January 2003, in addition to JICA Headquarters, this network has been established at the Tokyo International Centre, the Okinawa International Centre, and the Indonesia, Malaysia and Philippines Offices.
Knowledge Management	Abbreviated as KM. A broad range of interpretations of this phrase exist, but it generally refers to efforts to use all of the information and even wisdom within a company in all aspects of management, through the use of IT. In fact, although the systems, hardware, and software needed to bring knowledge management to reality do not presently exist, Lotus has started to use the term with respect to an evolving form of their groupware (Notes/Domino) and the term has now become a marketing catchphrase in the IT industry.
Linux	A free UNIX*-type operating system for personal computers. A Unix-compatible OS released as freeware, it is being improved by developers all over the world. It does not use existing OS code, can be freely adapted and redistributed, and is easier to use on low performance computers than other operating systems. It has outstanding network features and security, and is very stable. Linux is becoming more commonly used in academic institutions and is also frequently used as an Internet server in companies.
MCT	Multipurpose Community Telecenters: Mainly developed by ITU*, these are facilities with information and communication equipment that are established in the rural areas of developing countries to increase the use of IT, and which provide a variety of IT-related training and services.
Multimedia	Handling multiple formats of conveying information, such as still images, animation, audio elements and text, using digital technology. Also, devices and software used in this process.
Platform	OS (Operating System) or personal computer environment that provides the base on which software is run.
Protocol	Rules and conventions that govern the transmission of data between two computers.
Provider	A business that provides Internet connection services. Also called Internet Service Providers (ISPs*).
Remote Sensing	Technology that enables remote sensing of objects through sensor-equipped satellites, airplanes, and other equipment.
Unauthorized Access	Invasion of another network computer from the outside without following proper procedures. Includes stealing, destroying, or tampering with data, and sometimes includes changing network device configurations.

Terms/Abbreviations	Remarks
Universal Access	Access to IT* by everyone. Includes enabling everyone, including the elderly and those with disabilities, to use technology and facilities.
UNIX	Basic software (OS) used mainly in mid-sized computers called workstations. Includes software usable on personal computers such as Linux*, commonly called PC-UNIX.
USO	Universal Service Obligation: The responsibility of telecommunications carriers to provide all users with good service at a reasonable price.
VSAT	Very Small Aperture Terminal: An earth station with a very small antenna. A VSAT system is unidirectional or a two-way transmission system made up of a hub station, the network core, and a station (VSAT station) with multiple small antennas.
Waiting Applicants	Cumulative total of subscribers who cannot use their telephone even though they have completed procedures for subscribing to telephone service because the phone lines are undeveloped or do not connect.
WBT	Web Based Training: Training that uses content on the Internet (the Web) to ensure that a more uniform quality of training can be undertaken anytime, anywhere.
WSIS	World Summit on the Information Society
WWW	World Wide Web: A document system developed by the European Center for Nuclear Research (CERN). Links (a jump command) to other documents can be inserted in the document, and through these commands, it is possible to jump to any document located on a WWW server anywhere in the world that participates in the Internet.
xDSL	x Digital Subscriber Line: Generic term for technology that enables high-speed transmission through a twisted-pair cable. Speeds comparable to digital lines can be achieved through the existing telephone lines just by installing the hardware at both the telephone exchange station and the subscriber location. A typical example is ADSL*, a system with an accelerated downstream transmission speed.
Development Assistance	
Capacity Building	Enhancing ability to implement and manage capacity in response to institution building. Establishment of self-reliance in implementing parties.
DAC New Development Strategy	A long-term DAC* development strategy for the 21st century, adopted at a high-level meeting in 1996, that focuses on: ownership and partnership; and setting specific development goals (such as halving the proportion of the population in extreme poverty in the world by 2015). The strategy increases the expenditure ratio for social infrastructure and seeks to rationalize and decentralize implementing institutions in recipient countries.
Local Cost	The cost of implementing and managing a project that should be borne by the recipient country.
Medium-term Policy on Official Development Assistance	A systematic and specific five-year guideline on Japan's ODA* since 1999, aiming for effective and efficient implementation of assistance.
MDGs	Millennium Development Goals: Based on the DAC New Development Strategy*, it was agreed at the United Nations General Assembly (Millennium Summit) in September 2000. Goals to be achieved by 2015 are: (1) eradication of extreme poverty and starvation; (2) universal extension of primary education; (3) gender equality and women's empowerment; (4) reduction of the infant mortality rate; (5) improvement of the health of pregnant women; (6) prevention of epidemical diseases such as HIV/AIDS and malaria; (7) creation of a sustainable environment; and (8) establishment of global development partnership.
NGO	Nongovernmental Organization
ODA	Official Development Assistance
Official Development Assistance Charter	This charter established by the government of Japan in 1992 garners broader support for Japan's ODA through better understanding both at home and abroad and to implement it more effectively and efficiently. Japan attaches central importance to the support for the self-help efforts of developing countries toward economic take-off based on the idea that assistance was part of Japan's foreign strategy in the post-Cold War period.
OOF	Other Official Flows: Economic cooperation for developing countries based on the governmental resources but not included in ODA*.
Ownership	Self-help efforts by developing countries for their own economic and social development.

Terms/Abbreviations	Remarks
PRSP	Poverty Reduction Strategy Paper: Strategy paper for debt relief of the Heavily Indebted Poor Countries (HIPCs). Concept introduced and agreed on at the annual meeting of the World Bank and IMF in 1999. Aims for the effective application of financial resources generated by debt relief measures for appropriate development activities and poverty alleviation.
R & D	Research and Development
Sector Program	A sectoral or sub-sectoral program coordinated by relevant parties in development, including donors, under the ownership of the recipient countries.
Organizations	
ADB	Asian Development Bank
CIDA	Canadian International Development Agency
DAC	Development Assistance Committee: Coordinates the assistance policy of the OECD* to developing countries. One of three major committees of the OECD, along with the Trade Committee and the Economic Policy Committee. As of 2003 membership is 23 countries.
DAC High Level Meeting	A meeting held once a year in which high-level assistance officials from each DAC* country attend to discuss and adopt recommendations on particularly important development issues. In the 1996 DAC High Level Meeting of the OECD*, the meeting adopted the goal of halving the 1990 ratio of people living in extreme poverty by 2015.
DFID	Department for International Development (UK)
IDB	Inter-American Development Bank
IDRC	International Development Research Centre (Canada)
IMF	International Monetary Fund: Established in 1944. An organization that has supported post-war international finance along with the World Bank. While the World Bank has provided funding for reconstruction and development, the IMF has served to provide funds necessary for the fixed exchange rate system and for stabilizing currencies.
ITU (ITU-D)	International Telecommunication Union (Telecommunication Development Sector)
JBIC	Japan Bank for International Cooperation: Established in 1999 through the integration of the Export-Import Bank of Japan and the Overseas Economic Cooperation Fund.
JICA	Japan International Cooperation Agency
OECD	Organisation for Economic Cooperation and Development: Established in 1961 as a reorganized version of the Organisation for European Economic Co-operation (OEEC, established in 1948) to rebuild the European economy. Goals are economic growth, assistance to developing countries, and the expansion of multidirectional free trade. 30 member countries at present.
Sida	Swedish International Development Agency
UNCTAD	United Nations Conference on Trade and Development
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNDP	United Nations Development Programme
USAID	The United States Agency for International Development
World Bank	Generally refers to the two organizations, the International Bank for Reconstruction and Development (IBRD) and the International Development Association (IDA). The World Bank Group includes the above two organizations and the International Finance Corporation (IFC), the Multilateral Investment Guarantee Agency (MIGA), and the International Center for Settlement of Investment Disputes (ICSID).
JICA Terminology	
Community Empowerment Program	Started in FY1997. Support related to maternal and child health, welfare of the elderly, the disabled and children, and poverty alleviation measures are commissioned by JICA for local NGOs. Carried out as a part of Technical Cooperation Projects* from FY2002.
Development Studies	Small-scale studies that involve the formulation of simple basic development plans and the analysis of various types of basic data related to those plans, as well as surveys to make up for deficiencies in official statistics. Performed under the initiative and direction of overseas offices.
Grant Assistance for Grassroots Projects	A form of grant aid cooperation executed through Japan's overseas diplomatic offices to support small-scale projects that are not suitable to be undertaken through usual Grant Aid cooperation. Implemented in response to requests from local governments and non-governmental organizations (NGOs) in developing countries.

Terms/Abbreviations	Remarks
Grassroots Partnership Program	JICA's entrusting of cooperation on NGOs, local governments, and universities to provide more tailored and swift assistance. The maximum implementation period is for one year with less than 10 million yen. Carried out as a part of JICA Partnership Programs* from FY2000.
JOCV	Japan Overseas Cooperation Volunteers: A volunteer system established in 1965 for participants between 20 and 39 years of age. Approximately 23,000 volunteers have been dispatched to 76 developing countries.
Local In-Country Training (Second Country Training)	Training conducted in developing countries so that Japan's technical cooperation outcomes can be better disseminated throughout the developing country.
Master Plan Study	A study to draw up a comprehensive development plan on an overall country or a specific region, or a long-term development plan for a specific sector.
Partnership Program	Projects carried out by JICA as part of ODA to support cooperation activities targeting regional communities in developing countries through Japanese NGOs, universities, local governments, and non-profit foundations that intend to carry out international cooperation. Particular emphasis is given to the three areas 1) Technical Cooperation through personnel, 2) target projects or regions with a high urgency, such as in the case of reconstruction assistance, and 3) opportunities to promote the understanding of and participation of Japanese citizens in international cooperation.
Project-Type Technical Cooperation	A form of technical cooperation that is planned, implemented, and evaluated within a 3-5 year cooperation period. The scheme combines the dispatch of experts, acceptance of trainees, and provision of equipment. Starting in FY2002 several types of assistance are grouped together under the name Technical Cooperation Projects*.
Technical Cooperation Project	A cooperation project with certain objectives that need to be achieved in a specific time frame with a logical relationship between the output/outcome and input/activities, in which cooperation can be made up of a combination of dispatch of experts, acceptance of trainees, and provision of equipment to meet the objectives.
Third-country Training	Training in a comparatively advanced developing country in which the training utilizes that country's personnel who have received training through Japan's technical cooperation and invites trainees from other developing countries.

Terms with * are listed in this chart.

Sources: Constructed based on:
International Development Journal (1999) *Kokusai Kyoryoku Yogo Shu (Lexicon of International Cooperation)*,
IFIC/JICA (2001a) *The Information Revolution in Development Assistance*, and
Ascii Corporation, *Ascii Dejitaru Yogo Shu (Ascii Digital Glossary)* (http://www.ascii.co.jp/ghelp/index.html)

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Contents

Outline of Study

1. Background and Purpose of the Study

This study is the second phase of the study on Approaches for Systematic Planning of Development Projects carried out in FY2001. The study was designed to enhance country-specific approaches by strengthening issue-specific approaches. In the first phase of the study, four major development issues (Basic Education, HIV/AIDS, Promotion of Small and Medium Enterprises (SMEs), and Rural Development) were systematized and effective approaches for them were identified. Furthermore, the study reviewed JICA's activities based on Development Objectives Charts and the results were summarized as a report "Approaches for Systematic Planning of Development Projects."

As there was a growing demand for similar systematization of other issues as well, JICA decided to conduct a new study in FY2002. As a result of coordination within JICA's relevant divisions, this FY2002 study targeted the four issues: Poverty Reduction, Trade and Investment Promotion, Higher Education, and Information and Communication Technology.

The results of this study are envisioned to be constructive in the following ways:

- As basic information when formulating and revising Development Objectives Matrices for JICA Country Programs
- As basic information for project formulation studies and project and program formulation.
- As basic information when evaluating programs or carrying out country-specific evaluations.
- As materials for the JICA staff and Experts to use when they explain JICA's views on issues to recipient countries and other donors during meetings.
- To be stored in an Agency Thematic Database and shared within JICA with respect to views and approaches to issues.

2. Organization of this Report[1]

Chapter 1	Overview of the Issue (Current State, Definition, International Trends, Trends in Japanese Assistance)
Chapter 2	Effective Approaches for the Issue (Goals, Effective Approaches) *This chapter explains the systematized approaches and reviews JICA's activities on the basis of Development Objectives Chart.
Chapter 3	JICA's Cooperation Policy (JICA's Priority Areas, Points of Concern, and Future Direction)
Appendix 1	Major Activity Cases
Appendix 2	Basic Check List (including key indicators)
References	

[1] As the results of the study are intended to be utilized in JICA's Thematic Guidelines, the organization of this report was designed to be consistent with the standard organization of future Thematic Guidelines.

3. Structure of the Development Objectives Chart

In this study, a Development Objectives Chart similar to the following was created for each development issue.

Sample Development Objectives Chart (Information and Communication Technology)

Sample Development Objectives Chart (Information and Communication Technology)

Development Objectives	Mid-term Objectives	Sub-targets of Mid-term Objectives	Examples of Activities
1. Improvement of Ability to Formulate IT Policies	1-1 Establishment of Telecommunications Policy	Introduction of Competitive Market Principle	× Support formulation of foreign capital investment policy × Support policy to promote private investment × Support deregulation of market entry ○ Support formation of competitive markets
① Formulation of national IT strategy Key Indicators	① Number of service subscribers ② Scale of telecommunications industry ③ Advancement of liberalization	① Number of new market entries ② Scale of telecommunications industry ③ Price of communications	

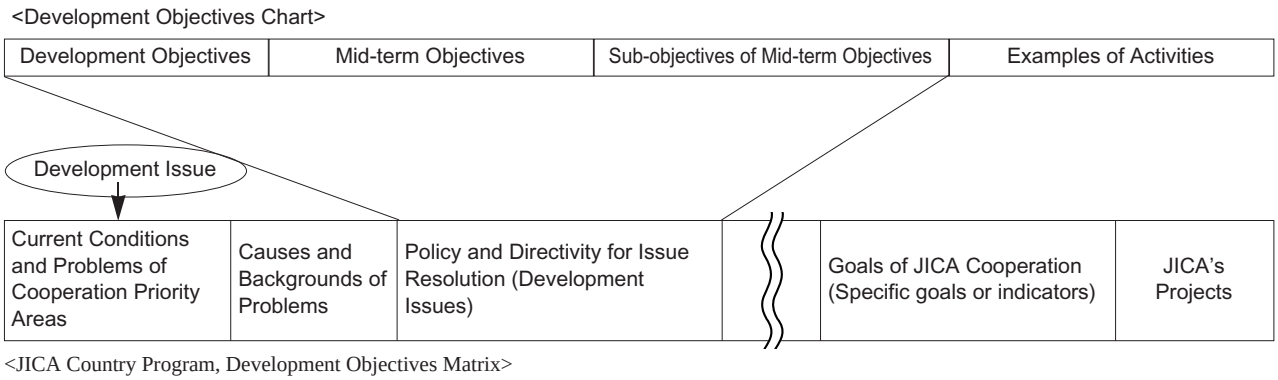
＊Circled Numbers imply key indicators
＊Marks in the column of Examples of Activities indicate how often JICA has implemented relevant projects.
◎: JICA has considerable experience, ○: JICA has certain experience,
△: JICA has experience as a component of projects, and ×: JICA has little experience.

"Development Objectives," "Mid-term Objectives," and "Sub-targets of Mid-term Objectives" in the above sample chart show the break-down of each development issue.

Development Objectives Chart includes a summary of "Development Objectives" and "Mid-term Objectives" for the purpose of showing the overall picture of an issue as well as the chart for each Development Objective including its "Examples of Activities" and JICA's relevant cases. A complete chart covering all items ranging from "Development Objectives" to "Examples of Activities" is annexed in the end of the report.

Generally, the relationship between the Development Objectives Chart and JICA Country Programs varies depending on the specific conditions of each country and sector. However, if "Development Issue" of this report corresponds to a "Priority Sector" of Development Objectives Matrix in JICA Country Program, "Development Objectives," "Mid-term Objectives," and "Sub-targets of Mid-term Objectives" in the Development Objectives Chart show the breakdown of "Policy and Directivity for Issue Resolution (Development Issues)" in the latter. (The goal level corresponding to the Development Issue differs depending on country or field.)

Relationship between the Development Objectives Chart and the Development Objectives Matrix of JICA Country Program



4. Task Force

The task force of this study is listed below. The task force was composed of four groups, and each group was responsible for drafting the respective article. The final study report was completed as a result of revisions of the draft articles based on the discussions at the Study Group meetings and a number of comments received from JICA staff of overseas offices and headquarters as well as external experts.

Members of Study Group

Chief	Director, Planning and Coordination Division, Planning and Evaluation Department	Hiroshi Kato
Poverty Reduction	Director, First Technical Cooperation Division, Social Development Cooperation Department	Eiji Inui
	Deputy Director, Global Issues Division, Planning and Evaluation Department	Harumi Okawa
	Associate Specialist, Global Issues Division, Planning and Evaluation Department	Toshinori Hamaguchi (until March 2003)
	Planning Division, Regional Department I (Southeast Asia and Indo-China)	Yasuhiro Kawazoe (also Trade and Investment Promotion)
	Associate Specialist, Second Technical Cooperation Division, Social Development Cooperation Department	Yuko Ishibashi
	Deputy Director, Project Monitoring and Coordination Division, Grant Aid Management Department	Masahiro Tawa (from January 2003)
	Second Research and Development Division, Institute for International Cooperation	Kanako Adachi (also a member of the secretariat)
	Permanent Mission of Japan to the United Nations	Yuko Ishizawa (until December 2002)
	Researcher, Global Link Management, Inc.	Harumi Iida (from December 2002 until February 2003)
	Support Unit, Poverty Reduction, Agency Thematic Network	Mitsuko Oishi (until March 2003)
Higher Education	Director, Programme Division, JICA Yokohama International Centre	Nobuko Kayashima
	Deputy Director, First Technical Cooperation Division, Social Development Cooperation Department	Jun Sakuma
	Associate Specialist, Second Technical Cooperation Division, Social Development Cooperation Department	Naoko Yamaguchi
	Researcher, International Development Center of Japan	Tomoko Masuda (from November 2002 until December 2002)
	Support Unit, Education, Agency Thematic Network	Keiko Shimada (until March 2003)
Trade and Investment Promotion	Director, Industrial Development Study Division, Mining and Industrial Development Study Department	Seiichi Koike
	Deputy Director, Industrial Development Study Division, Mining and Industrial Development Study Department	Hiroyuki Katayama
	Planning Division, Mining and Industrial Development Study Department	Kiyotaka Miyazaki
	Industrial Development Study Division, Mining and Industrial Development Study Department	Eriko Tamura
	First Technical Cooperation Division, Mining and Industrial Development Cooperation Department	Minoru Yamada
	Second Research and Development Division, Institute for International Cooperation	Akihisa Tanaka
	Senior Advisor	Shigeo Ishida
	Support Unit, Private Sector Development, Agency Thematic Network	Shu Nishimaru (until March 2003)
		Morihiko Sato (from April 2003)

Information and Communication Technology	Deputy Director, Wage and Allowance Division, Personnel Department	Jiro Inamura
	Deputy Director, Information and Systems Management Division, General Affairs Department	Takashi Tsuji
	JICA-Net Office, Mining and Industrial Development Cooperation Department	Kozo Nagami
	First Technical Cooperation Division, Mining and Industrial Development Cooperation Department	Hiroko Sannomaru
	Senior Advisor	Nozomu Goda
	Support Unit, Information and Communications Technology, Agency Thematic Network	Akira Goto
	Director, First Technical Cooperation Division, Mining and Industrial Development Cooperation Department	Yoshihide Teranishi
	Director, JICA-Net Office, Mining and Industrial Development Cooperation Department	Tadashi Ikeshiro
	Deputy Director, Planning and Financial Cooperation Division, Mining and Industrial Development Cooperation Department	Kenji Tobita
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Overview of Effective Approaches for Promoting the Use of Information and Communication Technology: Executive Summary

1. Overview of Information and Communication Technology

1-1 Current State of IT and its Importance

Information and communication technology (IT) is an important tool for improving economic productivity and efficiency of administrative services and it would be introduced into social sectors such as education in order to improve people's lives.

However, people (countries, or regions) who do not have enough opportunities to use or learn about IT, mainly those in developing countries, are not able to reap the benefits these technologies offer. The gap between people (countries, or regions) who have access to use and acquire IT and those who do not, what is called "digital divide," has become an important issue.

IT is also viewed as an important means for achieving economic growth and for improving the public and social sectors. The task at hand, therefore, is to create an environment in which everyone can use IT at an affordable cost anywhere and whenever they need.

1-2 Definition

IT includes both information technology and communication technology. It is technology for the purpose of inputting, storing, processing, transmitting, and outputting (displaying and printing) information, and is divided into hardware and software. In this report broadcasting and postal mail services are not included in IT.

1-3 International Trends

At the July 2000 Kyushu-Okinawa Summit a working group called the Digital Opportunity Taskforce ("DOT Force") was established to make the best use of opportunities provided by IT (digital opportunity) and for elimination of the digital divide. DOT Force membership includes stakeholders from the G8 governments as well as the governments of nine countries outside of the G8, companies, business organizations, NPOs, and international organizations, including the United Nations Development Programme (UNDP), the World Bank, the Economic and Social Council of the United Nations (ECOSOC), the International Telecommunication Union (ITU), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations Conference on Trade and Development (UNCTAD), and the Organisation for Economic Co-operation and Development (OECD). In July 2001, the DOT Force presented the Genoa Plan of Action at the Genoa Summit, and Implementation Teams were organized for each action point in the plan. In June 2002 Progress Report on the Genoa Plan of Action was submitted at the Kananaskis Summit. It mainly discussed issues such as supporting national e-strategies, increasing access and reducing cost, enhancing human capacity development, knowledge creation and sharing, promoting the use of IT in health care and in support against infectious diseases, and national and international efforts to support local content and application creation, what are included in each of the Development Objectives of this report.

In addition, IT-related section of the Millennium Development Goals (MDGs) agreed upon at the U.N. Millennium Summit describes: "In cooperation with the private sector, make available the benefits of new technologies, especially information and communications technologies." Furthermore, the Asian Regional Conference for the World Summit on the Information Society (WSIS) was held in January of 2003, and it adopted the "WSIS Tokyo Declaration" that has as its goal the development of an "Information Society" reflecting the linguistic and cultural diversity of Asia.

1-4 Trends in Japan's Assistance

The importance of eliminating the international digital divide has been clearly indicated in "Japan's Comprehensive Cooperation Package to Address the International Digital Divide," announced in July 2000, in the "Okinawa Charter on Global Information Society (IT Charter)" adopted at the Kyushu-Okinawa Summit, and in the "Tokyo Declaration" of the APT (Asia-Pacific Telecommunity) Asia-Pacific Summit on the Information Society held in November of the same year. The IT Basic Law that was formulated based on the above-mentioned efforts and the "e-Japan Strategy," "e-Japan Priority Policy Program," and the "e-Japan 2002 Program" also explicitly state technical cooperation to developing regions as well as the promotion of international harmonization and contribution. In these ways, Japan is continuing in its efforts to eliminate the international digital divide.

Finally, in June of 2002 the "e-Japan Priority Policy Program 2002" was announced following a review of the "e-Japan Priority Policy Program" and indicated strategies to enhance efforts in "promoting international harmonization and contribution" as a cross-cutting issue of the priority areas.

2. Effective Approaches for Promoting the Use of Information and Communication Technology

2-1 Goals for the Use of IT

The challenges that lie ahead in the IT sector are eliminating the digital divide and providing digital opportunities, mainly in developing countries. In addition, since IT is evolving and advancing rapidly and all types of information are becoming digitized, the goals here also include utilization of IT and digital content in other development issues and effective and efficient use of IT for international cooperation.

2-2 Effective Approaches for Promoting the Use of IT

Development Objective 1: Strengthening Capacity for IT Policy Formulation

In terms of telecommunications policy, it is important to provide policy guidance during the process in which a country moves from the stage of a state-owned enterprise to that of privatization and deregulation, with consideration for the importance of telecommunication operators in the communities while at the same time continuing to sustain the incentives for operators to improve their economical efficiency.

As for policies that foster the IT industry, it is important to keep policies and regulations (such as those to protect intellectual property rights and encourage research and development activities) to a minimum because the private sector should always take the lead.

To have policies that will eliminate gaps that exist within a country, it is essential to build appropriate support systems fitting with the structure of the telecommunications market with the goal of achieving universal service. Furthermore, to bridge gaps toward socially vulnerable groups, it is essential to increase and expand support systems in the private sector.

Policies that protect users should monitor and regulate the activities of operating companies from the perspective of security, ethics, and protection of personal information, so that users are not harmed by the provider's pursuit of economical efficiency.

Development Objective 2: Human Resources Development in IT

When developing IT engineers, it is important to ensure that there is at least a certain population of personnel who are competent to at least a certain technical level – in other words, it is essential to satisfy needs in terms of both quantity and quality.

Since the environment surrounding the IT sector changes very rapidly, it is necessary to extend assistance with the mechanism to continuously review its content in order to maintain technical levels.

Meanwhile, from the standpoint of ensuring the quantitative aspect, it is important to adopt measures that familiarize the population that is already playing an active role in society with IT and to increase the IT literacy of the population that will be entering society in the future while they are at the educational stage.

Raising education levels requires instructors to foster IT engineers, and rather than just simply increasing number of educators, emphasis should be placed on developing high quality educators.

In developing policy-makers it is important to carry out training to increase their capacity to formulate and implement appropriate policies regarding IT.

Development Objective 3: Improvement of Communication Infrastructure

A broad range of cooperation is required to promote the use of IT in developing countries, starting with improvement of a country's capacity to formulate IT policies, and this clearly requires a communication infrastructure, in particular, developing the telecommunications infrastructure. Improving telecommunications infrastructure requires the development of a backbone network and an access network. The provision of infrastructure in the rural areas is one of the important tasks as well but it needs to be carefully studied from a viewpoint of various costs involved. In addition, cooperation that makes it easier to use the Internet is indispensable.

Development Objective 4: Improvement of Efficiency and Effectiveness of Every Sector through the Use of IT

The use of IT in every sector can be roughly divided into: "promoting e-government" including promoting the internal efficiency of the government, online filing of application and notification procedures, disclosure of public information, and the participation of citizens in policy-making, and "using IT in each sector" including support for e-learning activities, support for content creation, use of IT as a tool for statistics and analyses, and gathering information using networks. With respect to promoting e-governments, it is typical to start by introducing computers for routine work and then to broaden the range of application. In using IT in every sector, it is effective to promote organizational efficiency and sharing and using information through information systems.

Development Objective 5: Improvement of Efficiency and Effectiveness of Development Assistance through the Use of IT

Advances in IT have made it possible to process all kinds of data electronically, and it is, therefore, effective to adopt digital methods for creating educational materials. Also, taking advantage of distance learning method through the use of IT will improve the overall efficiency of diffusing and transferring digitized technology and knowledge.

Using IT can promote the sharing of existing content between JICA and other donors and developing countries, and enables not only sharing, but also collaborative development of effective and efficient content. The use of IT will also make it possible to hold productive discussions without the constraints of time or space through TV conferencing for workshops and consultations with other donors and developing countries.

3. JICA's Cooperation Policy

3-1 JICA's Priorities and Points of Concern

Development Objective 1: Strengthening Capacity for IT Policy Formulation

In countries where the telecommunications business is run by a state-owned enterprise, the need is even greater to focus on providing assistance in operations and ensuring the soundness of the management of the state-owned enterprise, since it is responsible for improving the telecommunications infrastructure. In countries where the telecommunications business has been privatized, however, the aim should be on developing industrial activity through companies in the private sector. It is, therefore, important to carry out assistance for creating comprehensive IT policies that promote the development of rural infrastructure, user protection, and fostering the IT industry.

The measure of securing resources for policy-making needs consideration. This requires a framework in which JICA can make use of think tanks that are familiar with IT policies, personnel with actual administrative experience from ministries, agencies, and international organizations, and personnel from educational institutions.

Development Objective 2: Human Resources Development in IT

It is important to develop key persons in every country who are in charge of promoting the use of IT as well as guiding countries in establishment of frameworks to promote sustainable human resources development in IT under their own efforts. It is also essential to create systems and mechanisms for promoting the human resources development in IT, and to develop integral measures, including extension of results of efforts based on the successful model cases and improvement of IT literacy of as many citizens as possible.

In developing human resources in IT, the first priority is to increase the population of IT engineers who are active in their business field, while improving the quality of those engineers. For this purpose, priority would be given to improving the level of the existing IT engineer population and also to developing human resources by targeting young people who are at the stage of higher education or professional education.

Development Objective 3: Improvement of Communication Infrastructure

The telecommunications business at the core of developing the communication infrastructure is increasingly being privatized in the industrialized nations, and the same trend is observed in developing countries at higher stages of development. Meanwhile, although less developed countries are also influenced by these trends, they still need government-led measures and have a high potential need for ODA, and it is therefore important to respond to these.

Elimination of digital divide is not the only point for consideration here. Provision of telecommunications infrastructure in rural areas should be prioritized from the perspective of fulfilling basic needs as well.

Development Objective 4: Improvement of Efficiency and Effectiveness of Every Sector through the Use of IT

JICA has been cooperating to improve the operation of administrative agencies using IT in the form of providing computers and developing systems for statistics and patents (industrial property rights) since the first half of the 1980s. These efforts have been major activities of cooperation, and further will continue to be key issues along with the human resources development. Meanwhile, the disclosure of public information and the participation of citizens in policy-making should be taken into consideration when carrying out a variety of projects.

It is necessary to consider utilizing IT in every sector. Cooperation by using Geographical Information

Systems (GIS) to improve work efficiency, prevent disasters, and plan countermeasures by monitoring rainfall amounts, river flow rates, and environmental pollutants will also become increasingly important.

As a point of consideration, technical cooperation should be carried out mainly for systematization of works and creating prototypes. In planning of the systematization management and maintenance costs should be taken into consideration. In addition, in the information and communication fields the latest technology is sometimes the cheapest and most efficient, and it is therefore necessary to pay close attention to trends in technology.

Development Objective 5: Improvement of Efficiency and Effectiveness of Development Assistance through the Use of IT

With respect to this development objective, JICA should adopt a systematic method for the development of educational materials centered on the expansion of the distribution network for educational materials through JICA-Net and to create new content and improve and revise existing content.

Furthermore, in any type of project content should be digitized. It is desirable to enrich content by organizing and integrating it. An appropriate environment should be developed for joint development of contents in similar sectors among donors and developing countries. Furthermore, it is necessary to systematize the sector-specific knowledge in the knowledge management system operated by JICA.

Points of consideration include organizing the intellectual property rights and costs of materials, technology, and know-how for creating content, resolving language barriers, and comparing the cost effectiveness of face-to-face versus distance activities.

3-2 Issues to be Considered for Future Activities

(1) Assistance to Privatized Enterprises

In the current mechanism for Official Development Assistance (ODA) it is difficult to provide cooperation to privatized business entities. However, in the field of IT there are many cases in which the private sector carries the most responsibility in playing a leading role. It is therefore expected to look into the introduction of a flexible framework that enables cooperation for privatized business entities if the social benefit is great.

(2) Need for a Unit to Promote the use of IT

The use of IT is an issue that would involve all departments of JICA, and it is therefore necessary to consider establishing a specialized unit for the promotion and effective use of IT. This unit would summarize the progress of IT use in every sector and scheme and introduce examples of relevant projects, thereby, providing advice and information to all departments on the use of IT.

(3) Strengthening Distance Technical Cooperation

The effectiveness of distance technical cooperation is becoming more and more recognized, and therefore further development and utilization of content and techniques for remote lectures, e-Learning, and WBT (Web Based Training) will be important issues.

Chapter 1 Overview of Information and Communication Technology

1-1 Current State of IT and its Importance

The rapid development and spread of information and communication technology in the 1990s contributed to advancing industries and improving economic productivity of the countries and regions that embraced it. As computers became connected across national borders through networks such as the Internet, economic activity became globalized, costs dropped, and the time required for distribution of information was shortened (e.g. promotion of the IT industry, digitization of industries, supply chain management, e-commerce, and international division of work).

Information and communication technology is an important tool that can improve each of the economic, administrative, and social sectors. The task at hand is to create an environment in which anyone anywhere can utilize IT at an affordable cost.

Information and communication technology is also contributing to improved public service and efficiency through the digitization of office work, creation of own websites by ministries and agencies, and the availability of applications and notifications online as IT is introduced into governments and the public sector. IT is also contributing to improving people's lives as it is also increasingly being introduced into social sectors, such as through the diffusion of e-learning (distance education and learning) in the education sector. From the perspective of Women in Development (WID), many women are employed to perform work on a computer and IT is thus also contributing to promoting employment for women. In these ways, **information and communication technology is a very important tool that can be used to achieve improvement in each of the economic, administrative, and social sectors.**

Information and communication technology is said to bring about major historical changes in society that surpass those of the industrial revolution that started in England in the 18th century. The "e-Japan 2002 Priority Policy Program" states that just as the industrial revolution transformed the world from an agricultural society to an industrial society, the use of information and communication technology will dramatically reduce the time and cost of information distribution, will facilitate the exchange of highly dense information, and will bring about rapid and significant changes in socio-economic structures on a global scale. As a result, the world will move from an industrial society to an "Advanced Information and Telecommunications Network Society," in other words, we are rapidly moving into a society in which information and knowledge generate added value.

In January 2003, at the Asia-Pacific Regional Conference for the World Summit on the Information Society (WSIS), the concept of an information

society was defined as something which would accelerate and improve regional economy, social, cultural, and technical development. It was emphasized that IT should be fully utilized at every level of society and that all people should share the benefits of using information networks while continuing to value diversity and cultural heritage.

Meanwhile, **people (or countries and regions), mainly those in developing countries, do not have enough opportunities to use or acquire IT and therefore are not able to reap the benefits offered by these technologies. Thus the gap between these and people (or countries and regions) who have access to use and acquire IT, what is called "digital divide," has become an important issue.** The digital divide generates an economic divide, and, if the divide becomes too wide by leaving it alone, it may lead to social unrest.

Among various types of information and communication technologies progress and spread of Internet have especially significant impacts. According to NUA[1], approximately 600 million people were using the Internet as of September 2002, with 370 million or 62% of those in just the United States, Canada, and Europe and with 160 million or 26% in Japan, China, Korea, Taiwan, Hong Kong, Australia, Singapore, and New Zealand. The remainder comprising mainly developing countries in the rest of Asia-Pacific, Africa, the Middle East, and Latin America is only 74 million or only 12% of the total. The number of users in developing countries is on the rise, but the gap between those countries and industrialized nations remains great.

Information and communication technology should be viewed as an important means for achieving economic growth and for improving the public and social sectors. **The task at hand, therefore, is to create an environment in which anyone anywhere can use information and communication technology as needed at an affordable cost.**

1-2 Definition

The World Bank and other international organizations generally abbreviate "Information and Communication Technology" as "ICT," but since the abbreviation "IT" is commonly used in Japan, this report will use "IT."

IT includes both information technology and communication technology.

IT includes both information technology and communication technology. It is technology for input, storage, processing, transmission, and output (display and printing) of information and is divided into hardware (such as computers and peripheral devices) and software (such as information processing systems).

The digitization of information such as text, voice, and images has reduced errors during transmission and enabled transmission at higher speeds.

[1] NUA, "NUA Internet Surveys" (http://www.nua.ie/surveys/how_many_online/)

The development of the World Wide Web (WWW) system that serves as a basis for web pages has made it possible to obtain all of these types of information at the same time as they exist on the Internet.

With respect to broadcasting and postal mail services, these are issues that the World Bank includes in their definition of information and communication technology and that Japan's Ministry of Public Management, Home Affairs, Posts and Telecommunications (MPHPT) of Japan also mentions in its White Paper on Information and Communications in Japan. However, at JICA, broadcasting and postal mail services are considered to be essential underpinnings of society and are treated as separate development issues. They are therefore not included in this report.

In this report **cooperation in the field of IT refers to projects that have measures to promote the use of IT or measures to learn IT as a goal and projects that include such measures as part of their output/outcome or as a part of their activities, whether they are included as goals or not.** In terms of how to define what "part of" actually means, this can be determined while looking at the goals of a project when it comes time to create statistics or examples, and the conditions for selecting a project or not should be clarified on a case-by-case basis.

1-3 International Trends

1-3-1 Kyushu-Okinawa Summit

At the July 2000 Kyushu-Okinawa Summit, "The Okinawa Charter on Global Information Society" was adopted. At the same time, a working group called the Digital Opportunity Taskforce ("DOT Force") was established for making the best use of opportunities provided by IT (digital opportunity) and eliminating the digital divide. DOT Force membership includes stakeholders from the G8 governments as well as the governments of nine countries outside of the G8, companies, business organizations, NPOs, and international organizations, including the United Nations Development Programme (UNDP), the World Bank, the Economic and Social Council of the United Nations (ECOSOC), the International Telecommunication Union (ITU), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations Conference on Trade and Development (UNCTAD), and the Organisation for Economic Co-operation and Development (OECD).

1-3-2 UN Millennium Summit

At the UN Millennium Summit that was convened in New York in September 2002, the Millennium Declaration was adopted and the Millennium Development Goals (MDGs) were summarized as common objectives.

The MDGs raised eight goals and 18 targets for achievement by the year 2015. With respect to the field of IT, one of the goals is to "Develop a global partnership for development" and a target under it is "In cooperation with the private sector, make available the benefits of new technologies – especially information and communications technologies."

1-3-3 Genoa Plan of Action

In July 2001, the Genoa Plan of Action was presented by the DOT Force at the Genoa Summit. At the same time Implementation Teams were organized for each action point in the plan, and in June of 2002 a report on the state of implementation of the Genoa Plan of Action was presented at the Kananaskis Summit. The following are the action points on the Genoa Action Plan:

1) Support development of national e-strategies
2) Improve connectivity, increase access, and lower costs
3) Enhance human capacity development, knowledge creation and sharing
4) Foster enterprise, jobs and entrepreneurship
5) Strengthen universal participation in global ICT governance
6) Establish a dedicated LDC initiatives for ICT-inclusion
7) ICT for healthcare and support against disease
8) Support local content and application creation
9) Prioritize the contribution of ICTs in development assistance programs

These main action points are included in the development objectives raised in this report.

Box 1-1 Differences in Donors' Perspectives on IT

As interest in and expectations toward IT are growing through summits and other meetings, differences in the views and perspectives of various donors toward IT are emerging. The main differences are as follows:

Organization	World Bank, IMF, World Development Forum, private sector in general	UNDP, ECOSOC, FAO, most NGOs
Views on globalization	Sees globalization primarily in economic terms as beneficial. Same applies to ITs.	Sees globalization as a complex economic, political, and social phenomenon. Emphasizes the different impact of globalization. There are winners and losers, not just winners. Same applies to ITs.
Focus for IT	Digital Opportunity	Digital Divide
	Emphasis on "opportunities" provided by utilization of IT. Access is increasing rapidly, the divide is narrowing.	Emphasis on "divide," gaps in access and capacity due to lopsided diffusion of IT and its cause in delays. The divide will continue to increase unless pro-poor IT strategies are developed and implemented.
Important points for assistance	Emphasis on the adoption of appropriate policies in developing countries enabling them to take advantage of opportunities. Actual activities carried out by private sector.	Emphasis on the responsibility of a broad range of "partners" (donors and others) in ensuring that poorer countries and regions are not left behind.
IT that is emphasized	Emphasizes new ITs, and in particular the Internet.	Broader definition of ITs including old ITs such as radio and television.

Source: Barbara Fillip (2001) *Digital Divide*, JICA-USA

1-3-4 World Summit on the Information Society (WSIS)

The Asian Regional Conference for the World Summit on the Information Society (WSIS) was held in January of 2003 and it adopted the "WSIS Tokyo Declaration" that has as its goal the development of an "Information Society" reflecting the diverse languages and cultures of Asia. "WSIS Tokyo Declaration" was presented as the view of the Asian region at the WSIS in Geneva (Phase 1) in December 2003. Phase 2 is planned to be held in Tunis in 2005.

1-3-5 Major Donors' Activities

The assistance policies and major examples of cooperation from major donors in the field of IT are as listed in Table 1-1.

Table 1-1 Major Donors' Activities in IT

Assistance Organization	Characteristics of Assistance Policy	Major Activities
World Bank	Administration, education, health care, environment, welfare	InfoDev, WorLD, ICT for Education program, African Virtual University (AVU), GDLN, GDN, SBEM, Development Gateway
United Nations Development Programme (UNDP)	Building human capacity at the national level Efforts mainly on regional diffusion of the Internet	Info21, Internet Initiative for Africa (IIA), Asia-Pacific Development Information Programme, SDNP
Asian Development Bank (ADB)	Development of rural communication infrastructure	Village Phone (Bangladesh), Rural Telecommunications Project (India), Telecommunications Project (China)
International Telecommunication Union (ITU)	Diffusion of telecommunications technology, broadcasting technology	Assistance to e-commerce, telecommunications in health care, virtual training centers
U.S. Agency for International Development (USAID)	Revitalization of private sector investment, promotion of fair competition, flexible regulatory environment, assistance with democratization	IED Initiative, AfricaLink, Gemini Application Server, Leland Initiative (Africa), DOT-COM Alliance, South Africa Regional Telecommunications Restructuring
Canadian International Development Agency (CIDA)	ICT in regions without telephones, implementation by private sector	ICTs as sector in itself (IT sector reform, development of infrastructure), using ICTs as tools (education, healthcare, administration), using ICTs to promote knowledge sharing and networking (InfoDev, Bellanet)
International Development Research Centre – Canada (IDRC)	Closing of digital divide	ACACIA (Sub-saharan Africa), Pan Americas (Latin America), Pan Asia (Asia), Bellanet
Swedish International Development Cooperation Agency (Sida)	Use of IT in all programs Consideration to bringing benefit to the poor	IT assistance to universities and research institutions, InfoDev, Bellanet

Source: World Bank "Operational Strategy" (http://www.worldbank.org/html/fpd/telecom/operationalstrategy.html)
UNDP "INFO 21: ICT for Development" (http://www.undp.org/info21/)
ITU-D (http://www.itu.int/ITU-D/)
USAID "Information Technology" (http://www.usaid.gov/our_work/economic_growth_and_trade/info_technology/)
CIDA "CIDA's Strategy on Knowledge for Development through ICT" (http://www.acdi-cida.gc.ca/ict)
IDRC "Program Directions: 2000-2005" (http://www.idrc.ca/cpf/33_information.html)
Sida "ICT in Developing Countries" (http://www.sida.se/)

1-4 Trends in Japan's Assistance

There is a great deal of expectation placed on information and communication technology in terms of its bringing about economic development, expansion of employment, and improvement in people's lives. However, the international digital divide in the field of information and communication is widening, as is clearly observed in facts such as that in developing countries there are approximately 30 countries in which the telephone density is less than 1 for every 100 people. Therefore, the importance of developing information and communication networks on a global scale that include developing countries is growing.

1-4-1 Comprehensive Cooperation Package

In July of 2000, the Japanese government announced its "Comprehensive Cooperation Package to Address the International Digital Divide" prior to the Kyushu-Okinawa Summit.

IT development is led by the private sector, with the role of the public sector complimenting the private sector initiative by focusing on policy, human resources development and other areas. Based on this fundamental position, in an effort to eliminate the international digital divide, the Japanese government announced the preparation of a Comprehensive Cooperation Package through public funds (ODA and non-ODA), in the amount of approximately US$15 billion, as the target for the five year period starting in 2000.

The Comprehensive Package puts importance on the following four fields:

1) Raising awareness and contributing intellectually to policy and institution-building
2) Developing and training human resources
3) Building IT infrastructure and providing assistance for network establishment
4) Promoting the use of IT in development assistance

1-4-2 Contribution to the Digital Divide Elimination

The importance of eliminating the international digital divide has been clearly indicated in the "Comprehensive Cooperation Package to Address the International Digital Divide" that was mentioned in 1-4-1, the "Okinawa Charter on Global Information Society (IT Charter) " adopted at the Kyushu-Okinawa Summit in July 2000, and in the "Tokyo Declaration" of the APT (Asia-Pacific Telecommunity) Asia-Pacific Summit on the Information Society held in November of the same year. The IT Basic Law that was formulated in 2000 based on the above efforts and the "e-Japan Strategy," the "e-Japan Priority Policy Program," and the "e-Japan 2002 Program," all formulated in 2001, also

advocate technical cooperation for developing regions as well as the promotion of international harmonization and contribution. In these ways, Japan is continuing in its efforts to eliminate the international digital divide.

In June of 2002, the "e-Japan Priority Policy Program 2002" was announced following a review of the "e-Japan Priority Policy Program" and indicates IT strategies to enhance efforts in "promoting international harmonization and contribution" as a cross-cutting issue of the priority areas.

Table 1-2 below provides an outline of Japan's IT strategy on the issue of the international digital divide.

Table 1-2 Japan's IT Strategy on the International Digital Divide

Date	Details
November 2000	Basic Law for Formation of an Advanced Information and Telecommunications Network Society (IT Basic Law) Formulated to expeditiously and intensively promote measures for forming an advanced information and telecommunications network society. Provisions such as proactively carrying out technical and other international cooperation to developing regions are stipulated in Article 24.
January 2001	e-Japan Strategy The "e-Japan Strategy" was formulated by the Strategic Headquarters for the Promotion of an Advanced Information and Telecommunications Network Society (IT Strategy Headquarters) established within the Japanese Cabinet with the goal for "Japan to become the world's most advanced IT nation in the next five years."
March 2001	e-Japan Priority Policy Program The "e-Japan Priority Policy Program" gives shape to the "e-Japan Strategy" and was made to clarify all of the measures the Japanese government should take under that strategy. It places elimination of the international digital divide as an issue for the entire Japanese government and advocates the promotion of international harmonization and contribution.
June 2001	e-Japan 2002 Program The "e-Japan 2002 Program" was formulated as an annual program to enable each ministry to reflect the "e-Japan Strategy" and the "e-Japan Priority Policy Program" in each FY2002 policy. It states that cooperation to developing countries in Asia and elsewhere should be carried out proactively to promote international harmonization and contribution and that efforts should be made to close the international digital divide.
June 2002	e-Japan Priority Policy Program 2002 The "e-Japan Priority Policy Program 2002" was formulated based on a revision of the "e-Japan Priority Policy Program" that included an evaluation of Japan's achievements and international comparative rankings. It states the importance of Japan working toward making the Asian region the world's information "hub" so that Japan and other Asian countries can enjoy the benefits of a rich IT society and can establish new technological and socioeconomic axes around which further development will revolve. It also outlines the measures for such efforts.

1-4-3 Government Ministries' Activities

Based on the above-mentioned Comprehensive Cooperation Package, the entire Japanese government, with the Ministry of Foreign Affairs playing a central role, and in cooperation with JICA, the Japan Bank for International Cooperation (JBIC), and other organizations, has proactively been contributing to the sustainable development in the field of IT in developing countries by utilizing public funds (ODA and non-ODA).

Each relevant government ministry has also continued efforts toward measures on closing the digital divide. (See Table 1-3)

Table1-3 Major International Measures of the e-Japan Priority Policy Program 2002

Sector	Major International Measures
Formation of the world's most advanced information and telecom networks	Realization of a balanced global IT society through the development of an international Internet network • Asia Broadband Program (MPHPT and relevant government agencies) • Research on promoting the use of advanced IT in Asia (MPHPT) • Making Okinawa an international information and telecommunications hub (Cabinet Office, MPHPT, and METI) • Building a network to support policies and systems (MPHPT, MOFA)
Promotion of education and learning and development of human resources	Fostering and utilization of IT specialists and development of vocational skills in the IT sector • Standardization of certification system (METI) • Promotion of e-Learning in Asia (METI)
Promotion of e-commerce	Development of an international e-commerce environment (including METI)

Source: Barbara Fillip (2001) *Digital Divide*, JICA-USA

The Ministry of Public Management, Home Affairs, Posts and Telecommunications (MPHPT) in particular, has greatly shifted the focus of its technical cooperation toward elimination of the digital divide, and is carrying out assistance to human resources development, joint research, and broadcast program cooperation. In December 2002, the recommendations at the International Conference for Asia Broadband Strategy convened by the Minister of MPHPT included changes with respect to ODA in the IT sector such as a shift from request-based aid approach to more proactive project formulation, which indicates the prospect of future activities by MPHPT.

Chapter 2 Effective Approaches for Promoting the Use of Information and Communication Technology

2-1 Goals for the Use of IT

The important issues for the field of information and communication technology are to eliminate the digital divide and to provide digital opportunities in countries and regions, with a focus mainly on developing countries. The goal, therefore, is to use IT in a way that will tackle those challenges.

In addition, since IT is evolving and advancing rapidly, and all types of information are becoming digitized, the goals include the use of IT and digital content for other development issues and also effective and efficient use of IT in international cooperation as a whole.

This report describes specific approaches for promoting the use of IT based on the following four priority fields in Japan's "Comprehensive Cooperation Package to Address the International Digital Divide" announced prior to the July 2000 Kyushu-Okinawa Summit: 1) intellectual contribution to policy and institution-building, 2) development and training of human resources, 3) building IT infrastructure and providing assistance for network establishment, and 4) promoting the use of IT in development assistance. In this report 4) is divided into two areas: "improving efficiency and effectiveness of every sector through the use of IT" and "improving efficiency and effectiveness of development assistance through the use of IT." The latter relates to all the other Development Objectives, but we emphasize this point, because when knowledge is developed into content, globalized, and able to be distributed everywhere simultaneously, it has the potential for generating tremendous improvement in the efficiency and effectiveness of development assistance.

Given the above, five Development Objectives and corresponding Mid-term Objectives have been established as listed in Table 2-1.

Among these five Development Objectives, the following three have IT itself as a direct task and are will directly contribute to eliminating the digital divide and providing digital opportunities: 1. Strengthening Capacity for IT Policy Formulation, 2. Human Resources Development in IT, and 3. Improvement of Communication Infrastructure. The other two are concrete objectives for effectively and efficiently using IT and digital content: 4. Improvement of Efficiency and Effectiveness of every Sector through the Use of IT, and 5. Improvement of Efficiency and Effectiveness of Development Assistance through the Use of IT.

Table 2-1 Development Objectives Chart: Information and Communication Technology

Development Objective	Mid-term Objective
1. Strengthening Capacity for IT Policy Formulation	1-1 Establishment of Telecommunications Policy
	1-2 Establishment of Policy to Foster IT Industry
	1-3 Establishment of Policy to Eliminate Domestic Digital Divides
	1-4 User Protection
2. Human Resources Development in IT	2-1 Development of Engineers and Instructors
	2-2 Development of Policy Makers
3. Improvement of Communication Infrastructure	3-1 Provision of Communication Infrastructure
	3-2 Fostering Internet Service Providers (ISPs)
	3-3 Provision of Access Points
4. Improvement of Efficiency and Effectiveness of Every Sector through the Use of IT	4-1 Promotion of e-Government
	4-2 Promotion of the Use of IT in Every Sector (such as health-care, medicine, education)
5. Improvement of Efficiency and Effectiveness of Development Assistance through the Use of IT	5-1 Dissemination and Transfer of Existing Knowledge
	5-2 Sharing and Creation of Knowledge and Experience
	5-3 Use of IT in Project Implementation

2-2 Effective Approaches for Promoting the Use of IT

Development Objective 1
Strengthening Capacity for IT Policy Formulation

Development Objective 1 Strengthening Capacity for IT Policy Formulation

There are two aspects in goals of IT policies – economic progress and social consideration. The former is to optimize the supply of IT services through free competition, and the latter is to take social factors into consideration such as ensuring fairness for users who are often marginalized at the cost of pursuing economic efficiency and ensuring fairness in conditions of using IT.

Information and communication technology is made up of communication infrastructure, hardware, and software. The market structure and the relationship between the private sector and the government are different among communication services and the hardware and software industries. As a result, contents and directions of policies for promoting these industries are also largely different.

In addition, the field of IT requires not only policies that contribute to the growth of the overall industry on the provider side (such as telecom service providers and companies), but also policies that take into account fairness and protection on the side of the users.

Upon consideration of the above, four Mid-term Objectives have been established as indicated in Table 2-2 next page.

Table 2-2 Strengthening Capacity for IT Policy Formulation: Mid-term Objectives Chart

Goal of Policy		Mid-term Objectives
Economic Goal: Optimization of Supply	Complementary relationship	1-1 Establishment of Telecommunications Policy (Telecommunications Infrastructure)
		1-2 Establishment of Policy to Foster IT Industry (Hardware and Software Industries)
Social Consideration		1-3 Establishment of Policy to Eliminate Domestic Digital Divides
		1-4 User Protection

Mid-term Objective 1-1
Establishment of Telecommunications Policy

Policies suitable to every stage including state-owned enterprises, privatization and introduction of competition are needed.

Mid-term Objective 1-1 Establishment of Telecommunications Policy

The privatization and liberalization process in the telecommunications business takes a variety of shapes depending on the country, even in developed countries. Table 2-3 is a breakdown of the representative models for this process and the countries in which those models are observed.

Table 2-3 Models for the Introduction of Privatization and Liberalization

Model		Outline	countries
1	privatization + perfect competition	• privatization of state-owned enterprises • deregulated market entry	Malaysia, Philippines, New Zealand, Chile
2	privatization + gradual introduction of competition	• privatization of state-owned enterprises • monopoly/duopoly/oligopoly → to liberalization	Japan, England, Argentina, Mexico, Venezuela, Peru, Bolivia, Belgium, the Czech Republic, Denmark, Hungary, Italy, Australia, Hong Kong, Korea
3	liberalization (without privatization)	• continuance of state-owned enterprises • relaxed market entry restrictions	Brazil, Greece, Finland, Sweden, Colombia, India
4	private sector participation (without privatization or liberalization)	• granting concessions to the private sector • BOT (build/operate/transfer)	Thailand, Saudi Arabia, China

Although there are a broad range of models as indicated above, this report will discuss the second model that is observed in many countries including Japan, that is, the gradual process from state-owned enterprises to privatized monopolies to the introduction of the market principle, and will also address policy challenges at each of those stages. The issues commonly observed at each of the stages of this process and solutions for those are summarized as in Table 2-4.

Table 2-4 Issues and Resolutions at Each Stage

Stage	Common Issues	Solutions
State-owned enterprise	• Lack of investment capital • Lack of ability to keep up with technological innovations and increasing demands • Lack of incentive to become more efficient	• Increase profitability of operations • Recapitalization • Improve business operations (improve organization and management)
Privatized Monopoly	• Lack of a competitive environment • Stock held and controlled by the government	• Monitoring of rate setting and quality • Reduction of stock holding ratio →Expansion of private investment and introduction of foreign capital
Introduction of the Market Principle	• Market controlled by providers that dominate the market share (especially former state-owned enterprises) • Inhibited market entry (legal or institutional restrictions)	• Approval and monitoring of connection agreements • Introduction of a system for fair approval and authorization

At the state-owned enterprise stage, the issue of insufficient investment capital is a prominent one. Despite a high expected rate of return on investment in the telecommunications services, sufficient investment has not been made in developing countries[2]. Although privatization can serve as a fundamental solution to this issue, various circumstances such as the political importance of telecommunications infrastructure and job security of the employees at state-owned enterprises often make it difficult to achieve rapid privatization. Under these circumstances, first the business profitability of the state-owned enterprise must be improved in order to effectively use the limited investment capital. It is also important to provide assistance in the formulation of fair and reasonable plans for infrastructure development as well as assistance for sound management[3]. State-owned enterprises are often lacking in the ability to keep up with technological innovations and increasing demands and often do not have incentives to improve their service or to become more economically efficient. This situation results in "waiting applicants", or people who are unable to receive necessary services[4]. When formulating plans for improving infrastructure, it is essential to do it at a scale and with technology that is appropriate from both the short-term and the long-term perspective, while keeping business profitability in mind. Once these conditions are in place, work can be started on readying laws and institutional frameworks for privatization.

[2] According to World Bank, B. Wellenius and P. Stern eds. (1994), despite rate of returns of 20-30% or more, in the latter half of the 1980s investment of only 0.4-0.6% of the GNP on average was made in developing countries.

[3] Here the concept of "policy" is broadened and includes management plans for state-owned enterprises. This is because of the fact that at the state-owned enterprise stage the government's telecommunication policies and the business activities of state-owned enterprises are directly and closely interlocked. Related discussions are included in the Development Objective "Improvement of Communication Infrastructure," however, this objective deals with the specific infrastructure improvements that accompany direct investment.

[4] "Waiting applicants" are the cumulative total of subscribers who cannot use their telephones even though they have completed the procedures for subscribing to telephone service because the phone lines are undeveloped or do not connect.

Even if privatization is not followed through, policy options for issue resolution at the state-owned enterprise stage still remain, including the revitalization of private capital through the granting of concessions as observed in Thailand and China and authorizing market entry for the private sector while state-owned enterprises continue to operate as seen in Northern Europe.

At the stage following privatization, it is important to monitor providers in terms of the quality and charges of communication services. Following the privatization of the state-owned enterprise, the former state-owned enterprise is often allowed to monopolize the market for a specified period of time for various reasons, including allowing it to build up strength prior to introducing competition. When the market principle is not at work, it is essential to monitor whether inexpensive and quality service is being provided, through the approval of rates and business plans. At this stage, stocks are usually held by the government. However, it is necessary to slowly reduce the government's stock holding ratio and to introduce private investment and foreign capital.

At the stage in which competition is introduced, it is important to promote new entries into the market by doing away with regulations and systems that allowed market monopolization by the former state-owned enterprise while creating a fair competitive environment. It is necessary to gradually promote competition and aim for the goal of developing a sound industry by implementing business laws that allow new entry of providers and by allowing market entry of not only domestic capital but also foreign capital. The point for creating a fair competitive environment is eliminating control of the market by the former state-owned enterprise. Simply creating institutional frameworks for introducing competition without creating measures to deal with this point will result in insufficient competition. Because the former state-owned enterprise owns the existing infrastructure, in particular the lines that terminate at the users, in order for new entrant providers to supply end-to-end service they must connect with the former state-owned enterprise. Here it is vital to monitor from a public standpoint whether connection agreements have been concluded fairly. With respect to establishing connection rates and conditions, the government must check obstruction against market entry.

JICA's Activities

JICA's efforts in telecommunications policy have been made mainly through the Dispatch of Policy Advisors. In countries that are at the state-owned enterprise stage, JICA also conducts Development Studies to support the formulation of plans for improving infrastructure. However, JICA does not have much experience of cooperation in both of these areas. In the future, it is important to build effective assistance models that correspond to the stage of the telecommunications market in the target country.

With respect to providing support to the operations of state-owned

enterprises, JICA has dispatched advisors on operation and management frameworks and on formulating plans for improving infrastructure towards Laos. Development Studies have also been conducted to formulate a master plan for development of infrastructure, and advisors on the administration of communications have been dispatched to Laos. If these efforts are well-linked and complement each other, they can be used as model case for cooperation at the state-owned enterprise stage.

As for cooperation in the stage following privatization, JICA has dispatched policy-related Experts to Indonesia and the Philippines. In Indonesia's "Telecommunications Policy Advisor" project, cooperation by Experts included comprehensive efforts such as developing a fair competition environment, establishing rate policies, building a system for interconnection, and a Universal Service Obligation[5].

Mid-term Objective 1-2
Establishment of Policy to Foster IT Industry

The private sector should take a leading role and the government should formulate the minimum necessary policies.
Examples of policies:
- Maintenance of a competitive environment
- Promotion of private investment and foreign capital
- Technological neutrality
- Activities to encourage technology R&D
- Protection of intellectual property

Mid-term Objective 1-2 Establishment of Policy to Foster IT Industry

IT-related industries are defined as hardware and software industries here, and Mid-term Objectives for these have been established separate from those for telecommunications services. As compared with the telecommunications service industry, the dependence on infrastructure and facilities here is smaller and the barriers to market entry are lower, resulting in much different interactions between the government and providers. The bottom line is that the private sector should always play a leading role, applying unnecessary regulations should be avoided, and policies should be kept to the very minimum.

The following are considered to be important for the development of sound IT-related industries:

- Maintenance of an open and active competitive environment
- Promotion of private investment and foreign capital
- Technological neutrality
- Assistance to research and development (R&D)
- Protection of intellectual property

Efforts in the area of policies for fostering the industry include preferential treatment in terms of tax systems and finances to promote investment and industrial activity. It is also important to promote and encourage research and development from a long-term perspective, although it may not contribute to the short-term profitability of private sector companies.

To maintain technological neutrality, although the approaches may differ even among industrialized nations, it is important to promote competition between a wide variety of technologies and to provide and sustain a market environment in which the best technology self-selects, rather than to promote a

[5] Universal Service Obligation (USO) is the obligation to provide good service to all users at an affordable cost.

specific technology through policies[6].

It is important to protect intellectual property rights in order to maintain the incentive for developing new products in the overall industry and to establish status as an international market. In addition, with protection of intellectual property, it is significant to not just introduce regulations and laws, but to strengthen a framework for ensuring that they are actually enforced.

In terms of developing a fair competitive environment, it is important to monitor and arbitrate actions that attempt to control the market through the network externality that is inherent in the field of IT, as was seen in the Microsoft case in the United States.

Furthermore, it is absolutely essential to develop human resources who can formulate policies for fostering the IT industry as mentioned above.

JICA's Activities

JICA has dispatched policy advisors on IT to Thailand and Multimedia Policy Advisors to Malaysia. In both cases, the main goal was to promote research and development activity in the field of IT and advice was made on how the government can best promote technological development through policies. From the perspective of promoting research and development, target countries are limited depending on the level of development.

Finally, since the protection of intellectual property rights is an issue that is not limited to the field of IT but is also dealt with in cooperation frameworks that are related to industrial property rights, this issue will not be discussed here.

Mid-term Objective 1-3
Establishment of Policy to Eliminate Domestic Digital Divides

Mid-term Objective 1-3 Establishment of Policy to Eliminate Domestic Digital Divides

The domestic digital divide is not limited to regional disparity, but there are also disparities with socially vulnerable groups (such as the poor, women, minorities, and disabled persons). Bridging each of these gaps and enabling all persons to equally enjoy the benefits of information and communication technology are important policy issues.

As for regional disparities, it is necessary to establish the frameworks to provide support for the development of infrastructure in rural areas where there is little expected profitability. When the fixed communications network is being operated by a monopolistic provider, it is necessary to ascertain whether fair consideration is being given to rural areas when approving rates and business plans. Meanwhile, in countries that have introduced competition it is important to create frameworks (Universal Service) to provide service broadly to all people. An example of this is in the U.S. where there is a system to collect a

[6] Policies that ensure that compatibility is obligatory are needed from the perspective of eliminating any inefficiency resulting from the co-existence of a wide range of technology standards in the market.

- For regional divides – develop rural infrastructure
- For consideration to socially vulnerable groups – support ISPs for low income earners and the disabled and develop and popularize content that promotes social independence

single, uniform tax from all users and to give as a subsidy to providers who are voluntarily developing infrastructure in rural areas.

In terms of giving consideration to socially vulnerable groups, it is effective to establish systems that publicly support the establishment and operation of ISP services for those in lower income brackets and for the disabled (such as visually or hearing impaired). In terms of policies, it is also effective to **assist in the development of content that can promote social independence** and to **support the popularization of the Internet** through partnerships with NGOs.

JICA's Activities

As previously mentioned, JICA is dispatching Experts as policy advisors in areas including policies to promote the development of infrastructure in rural areas, such as the Dispatch of Experts for "Telecommunications Policy Advisor" project in Indonesia. Also, in formulating master plans for infrastructure development through Development Studies, JICA has carried out cooperation efforts in countries including Viet Nam, Mongolia, and Ethiopia with a focus on expanding communications networks to rural areas. Furthermore, in the new type of assistance "The Study on Enhancement of Info-Communications Access in Rural Communities," JICA has carried out cooperation in contributing to the elimination of the digital divide in rural areas through such efforts as the establishment of pilot Rural Internet Centers (RIC).

JICA's efforts thus far have focused on "hard" aspects such as how to best expand telecommunications infrastructure to rural areas. In the future it is necessary to continue such efforts while also filling the needs in terms of "soft" aspects such as in providing content that of use to socially vulnerable groups and for people living in rural areas as well as content that contributes to social welfare.

Mid-term Objective 1-4
User Protection

- Protection of personal information
- Ethical regulations
- Monitoring of unfair contracts and transactions
- Security maintenance

Mid-term Objective 1-4 User Protection

Protecting the users (individuals and organizations) of IT related services and products is an important policy issue for sound industrial development. Particularly important themes include **the protection of personal information, ethical regulations, monitoring of unfair contracts and transactions, and security response such as protection against unauthorized access.** All of these require more than just the creation of a framework that includes systems and regulations, but also the development of organizational capacity to enforce these. It is also necessary to increase knowledge and awareness on the part of users.

JICA's Activities

Although JICA has almost no track record of cooperation focused on this area, there have been some experience as a component of the cooperation through Experts dispatched as Policy Advisors. In the future as well, **it would be difficult to extend cooperation efforts with focus on this area**, and it is probably more realistic and effective to **carry out cooperation or to make recommendations in order to support telecommunications policies and the development of infrastructure in rural areas.**

Development Objective 1 Strengthening Capacity for IT Policy Formulation

Mid-term Objective 1-1 Establishment of Telecommunications Policy			
Indicators: ①Number/rate of service subscribers, ②Scale of telecommunications industry, ③Degree of liberalization			
Sub-targets of Mid-term Objectives	**Examples of Activities**	**Case No.**	**JICA's Main Activities**
Support for Improvement of Management of State-owned Enterprise ①Decline in number of waiting applicants ②Improved balance of income and expenditures in state-owned enterprise ③Increase in amount invested in infrastructure	◎Support for the formulation of national development plans ○Improvement of the management of the state-owned enterprise △Support for the formulation of policies for the shift over to privatization	10, 12, 15, 18 1, 10, 11, 12, 14 13	Formulation of telecommunications development plans (Development Study) Support for management and operation systems (Development Study/Training) Support for policy formulation (Experts)
Regulations on Private Monopolies ①Decline in number of waiting applicants ②Improvement in capital structure (percentage of government-owned capital) ③Increase in amount invested in infrastructure ④Increase in amount of foreign capital input	○Support for the establishment of a system for regulations on providers (monitoring service levels and established charges) ×Support for the formulation of policies for introduction of foreign capital ×Support for policies that promote private investment	4	Establishment of policies for charges and development of a fair competitive environment (Experts)
Introduction of Market Principle ①Number of new market entries ②Increase in the scale of the telecommunications industry ③Decline in the service charge of communications	×Support for the formulation of policies for introduction of foreign capital ×Support for policies that promote private investment ×Support for deregulated market entry ○Support for the formation of a competitive market (monitoring system on actions by the former monopolistic provider that would block new market entry)	3, 6, 8, 16	Polices for interconnectivity of communication providers, and Industry fostering plan (Experts/Training)

Mid-term Objective 1-2 Establishment of Policy to Foster IT Industry

Indicators: ① Scale of the IT industry, ②Share of IT-related industries, ③Amount of private sector IT investment, ④ Significance of the IT industry in the national economy

Sub-targets of Mid-term Objectives	Examples of Activities	Case No.	JICA's Main Activities
Establishment of Direction and Policy for Fostering IT Industry ①Existence of laws or government policies ②Existence of exclusive organizations	△Advice on the direction of fostering the IT industry ×Formulation of policies on IT-related privatization △Formulation of policies on IT-related investment promotion ×Formulation of policies for introduction of IT-related foreign investment △Support for developing and enforcing laws and ordinances related to information and communication	5, 6, 9	Formulation of basic plans for promoting IT, recommendations related to specific administrative provisions in the IT industry, long-term plans for fostering the industry, and plans to promote research and development (Experts/Training)
Establishment of Systems to Protect Intellectual Property Rights ①Existence of laws related to protection of intellectual property rights ②Existence of exclusive organizations	○Support for developing laws related to protection of intellectual property rights ×Support for establishing and operating organizations for protection	58, 59, 60, 61	Development and enforcement of legal framework (Technical Cooperation Project, Development Study)
Development of Policy Makers (High Level Human Resourses)	○Support and training for development of high level human resources	2, 17, 23	Executives' Seminar (Training)

Mid-term Objective 1-3 Establishment of Policy to Eliminate Domestic Digital Divides

Indicators: ① Regional differences in Internet use, ② Regional differences in fixed and mobile telephone subscription, ③ IT use by vulnerable groups (the poor, disabled, women)

Sub-targets of Mid-term Objectives	Examples of Activities	Case No.	JICA's Main Activities
Establishment of Policy to Promote Development of Infrastructure in Rural Areas ①Increase in user ratio in rural areas	○Support for the introduction of systems to assist rural development (Universal Service)	4, 7, 8, 15	Development of rural communication networks, support for formulation of plans to increase regional information (Experts/Development Study)
Improvement in IT Literacy ①Existence of policies to improve literacy ②Increase in user ratio among the poor ③Literacy surveys	△Promote the use of the Internet △Systems to assist services that provide relief to vulnerable groups	7	Increasing regional information through the use of Regional Internet Centers (RIC) as a base (Development Study)

Mid-term Objective 1-4 User Protection

Indicators: ①Number of claims and handled claims against related organizations

Sub-targets of Mid-term Objectives	Examples of Activities	Case No.	JICA's Main Activities
Development of Laws for User Protection ①Existence of laws or government policies	×Training for related personnel △Development of security systems ×Development of systems to protect personal information ×Development of systems to protect consumers ×Development of systems to prevent unauthorized access	6	
Establishment of Dispute Settlement Organizations ①Existence of exclusive organizations	×Establishment and operation of dispute settlement organizations		
User Education ①Situation of User protection	×Support and training for user education		

Examples of Activities:
◎→JICA has considerable experience
○→JICA has certain experience
△→JICA has experience as a component of projects
×→JICA has little experience

Development Objective 2
Human Resources Development in IT

Mid-term Objective 2-1
Development of Engineers and Instructors

It is important to secure both the quality and quantity of engineers.
Qualitative improvement: Creating or improving certification systems and registration systems
Quantitative expansion: Development of working people. Human Resource Development at the educational stage.

Development Objective 2 Human Resources Development in IT

Mid-term Objective 2-1 Development of Engineers and Instructors

In developing engineers, it is important to **meet both qualitative and quantitative needs by ensuring at least a certain number of personnel with a certain technical level.**

Ensuring the technical level of personnel requires some sort of certification exam or registered engineer systems. For instance, in Japan the Ministry of Economy, Trade and Industry (formerly the Ministry of International Trade and Industry) has been holding its Data Processing Technicians Examination since 1969. Also, the e-Japan framework of the Japanese government includes many project plans such as the Formulation and Popularization of IT Skills Standards, an effort to standardize the assessment standard of high level IT capacity used in determining the proficiency of IT skills while adjusting to international standards and the Promotion of the Asia e-Learning Initiative, which is the mutual authentication and dissemination of skills standards for data processing engineers.

In particular, since the environment surrounding IT sector changes very rapidly, systems must continuously change with the times even after they have become institutionalized. In fact, this system in Japan has undergone two major reviews in 1994 and in 2001 and has added new qualifications in order to reflect industry trends. Accordingly, when considering all the types of cooperation, not only the establishment of systems but also **mechanisms to continuously review contents are required**.

If a framework for objectively and concretely evaluating technical levels according to the conditions at that time is established internationally, it will promote international mobilization and more appropriate treatment of human resources and will eventually lead to the assurance of new human resources.

Although recipient countries tend to want to learn state-of-the-art skills and techniques, it goes without saying that it is important to consider the applicability and cost effectiveness of the training for the recipient country, and assistance should instead be centered on teaching more established skills and techniques.

Meanwhile, from the standpoint of ensuring enough human resources in numbers, two aspects in terms of the target population are necessary to be considered. The first aspect is to **familiarize the adults already active in society with IT**, such as government employees and private sector employees. **IT itself is not the ultimate goal but rather merely a means to achieve other goals**, and since these people already have practice in business, immediate

effects of learning IT skills would be expected. Another aspect is to develop the younger people that will go out into society in the future while they are at the educational stage. From a long-range perspective it is necessary to conduct training for fostering new engineers at the higher education levels, but also more importantly IT should be actively introduced at the elementary and secondary levels in order to enlarge the base population of potential engineers. At the same time, it is important to **continue the widespread development of human resources who have acquired computer literacy as a basic ability**.

It is required to develop instructors to foster engineers. Quality of instructors should be more emphasized than their quantity.

Furthermore, raising education levels **requires instructors who can develop engineers**. Here, we must give consideration to the role and responsibilities of instructors, and **emphasis should be placed on developing high quality instructors** rather than simply increasing those in numbers. There is a wide range of possible cooperation partners, such as vocational schools, polytechnics, institutions of higher education, and research institutes.

IT-related training at the Okinawa International Centre

JICA's Activities

JICA Okinawa International Centre has been holding computer courses and carrying out Multimedia Technology for Education and Communication (MTEC) since it opened in 1985. The initial computer courses started out by using hosts for courses to develop data processing engineers, and over the years the content of the course was periodically reviewed. As a result, from FY1993 the courses were divided equally between hosts and C/S (client servers) and since FY1997 training on hosts has been eliminated and all training has been shifted to C/S. As of 2003 nine types of courses are held 12 times annually, and in them approximately 140 engineers in total are trained every year including: network engineers, web designers, database engineers, system analysts, IT administrators, and IT instructors. MTEC courses began as audio-visual technical courses that were mainly focused on technology for taking and editing photographs and videos. However, following that the creation of educational materials was added, and training has shifted to the present concept of multimedia technology as a means for education and communication. Currently approximately 25 participants are trained every year in fields such as multimedia production for education and digital video production.

Training in the rapidly advancing field of IT **must always be revised in order with the times** so that technical trainings as needed by developing countries can be conducted.

In the rapidly advancing field of IT, the content of technical cooperation must be continuously reviewed.

In the "Human Resource Development in Information Technology" project in Sri Lanka, efforts have been concentrated on developing content developers for WBT (Web Based Training) and IT trainers. In the "Information Technology Training" project in Viet Nam, a training course has been set up for Hanoi University of Science to provide trainer's training such as carrying out cooperation to provide management know-how.

Other recent notable achievements include increased cooperation for higher education institutions such as universities and polytechnics in addition to the research institutes of government agencies. From the long-term perspective of expanding the base of engineers, JICA has been greatly contributing to the development of future engineers.

Coaching of teachers is also increasing at the sites through volunteer projects.

Furthermore, some of the activities of groups such as JOCV and Senior Overseas Volunteers at the actual educational sites have included developing and training teachers as well as students.

Mid-term Objective 2-2
Development of Policy Makers

Mid-term Objective 2-2 Development of Policy Makers

In order to formulate and implement appropriate policies regarding IT, it is important that policy makers understand the significance of IT and the points of concern for promoting the use of IT, that they formulate measures in line with the actual conditions of their countries, and then those are appropriately implemented. To do so, it is necessary to conduct training to improve the capacity of these policy makers.

JICA's Activities

JICA is carrying out projects in this area including: Dispatch of Experts as Advisors to Laos in the "Advisor on Telecommunication Policy to the Cabinet Office" project, to Indonesia in the "Telecommunications Policy Advisor" project, to Thailand in the "IT Policy" project, and to the Philippines and Malaysia in the "Telecommunications Policy Advisor" projects; and through a Development Study in Myanmar in the "Assistance in Structural Adjustment of the Myanmar Economy (IT Industry)" project. In these cooperation efforts, JICA is not simply giving advice or offering the results of Development Studies, but also is contributing to the development of policy makers in those countries through the processes.

Also, the JICA Tokyo International Centre is conducting training on "Telecommunications Policy Advisors." It provides courses on Japan's past experience, background, process, current status, and policies related to the privatization of its telecommunications business for policy makers at the department chief level from agencies that are in charge of telecommunications. Through these courses, JICA is supporting the formulation of regulations and policies that will accompany the privatization of the telecommunications business.

Development Objective 2 Human Resources Development in IT

Mid-term Objective 2-1 Development of Engineers and Instructors

Indicators: ① Supply and demand conditions in each technical field, ② Standards for technical level

Sub-targets of Mid-term Objectives	Examples of Activities	Case No.	JICA's Main Activities
Expansion of Content ①Number of Web pages created in the own country ②Number of times content is accessed	◎Transfer of Web content creation technology ◎Transfer of multimedia content creation technology ○Promote the creation of local content	27, 31, 32, 36, 57 32	Various human resource development (Technical Cooperation Project) Creation of educational content (Technical Cooperation Project)
Development of IT Engineers ①Number of network engineers ②Number of database engineers ③Number of Web engineers ④Number of security engineers	◎Transfer of network technology ◎Transfer of database technology ◎Transfer of Web technology ◎Transfer of security technology ◎Creation of content for technical transfer ◎Use of JICA-Net in technical transfer ×Support for creation of local fonts and FEPs ×Support for technology to create low-cost PCs ○Promotion of the use of open and free software ○Vocational training (technical transfer of skills useful for competing in the industry, occupational skills training) ◎Technical transfer of other special information technologies (including AI, CAD/CAM, GIS, GPS)	19, 20, 32, 33, 36 32, 33,34, 36 32, 34, 36 72 32 21 26, 29, 31, 41	Various group training courses (multiple courses) Various types of human resource development (Technical Cooperation Project) Support for institutions of higher education (Technical Cooperation Project)
Increasing and Improving Educational Institutions ①Number of schools specialized in IT ②Number of IT related instructors	◎Development of facilities for IT-related education ◎Provision of IT-related equipment and materials ○Support for research and development (R&D) ◎Support for degree program courses ◎Development of instructors for IT	31, 32, 36, 46 9, 36 31, 41 24, 32	Various types of human resource development (Technical Cooperation Project) Support for institutions of higher education (Experts/Technical Cooperation Project) Support for educarion IT (Training/Technical Cooperation Project)
Technological Improvement in the Field of Communication ①Number of engineers in communication network maintenance ②Number of engineers in high-speed communication network	○Technical transfer of communication network maintenance ○Support for high-speed communication networks technology.	34, 38	Development of telecommunications engineers (Technical Cooperation Project/Training)

Mid-term Objective 2-2 Development of Policy Makers

Sub-targets of Mid-term Objectives	Examples of Activities	Case No.	JICA's Main Activities
Development of Administrative Human Resources ①Number of personnel to be trained per administrative organization	◎Human resource development training of government officials at the actual working level	9, 13, 22, 23	Dispatch of Experts as Advisors Fostering of government officials (Training)

Examples of Activities:
◎→JICA has considerable experience
○→JICA has certain experience
△→JICA has experience as a component of projects
×→JICA has little experience

Development Objective 3
Improvement of Communication Infrastructure

Development Objective 3 Improvement of Communication Infrastructure

The term "information and communication technology" is broadly used as an extension of the concept of multimedia that has existed for a long time. IT is generally thought of as an amalgamation of data processing, telecommunications, and broadcasting. In particular, these days, as the use of the Internet and network technology has become even more important, there is growing focus on how to effectively use information and communication technology (IT) in all sectors of social activity.

Promoting the further use of IT requires supporting policies, developing human resources, and carrying out activities that are specific to individual sectors – but to make those possible, the communication infrastructure must first be improved. The following is a discussion of the direction of cooperation indicated in each of the following Mid-term Objectives with respect to this Development Objective.

Mid-term Objective 3-1
Provision of Communication Infrastructure

Mid-term Objective 3-1 Provision of Communication Infrastructure

In the case of communication infrastructure, it is necessary to consider the backbone network and access network separately, from the standpoint of the function of the communications network. Moreover, in developing countries, it is necessary to also deal separately with the aspect of infrastructure development in rural regions.

Consideration of three aspects:
- Backbone network
- Access network
- Rural infrastructure

When developing backbone networks, even in developing countries, it is inevitable to progress in the direction of introducing packet communication-based IP networks. Difficulty in predicting the demand for mobile phones and Internet use makes it important to consider how much extra potential communication capacity should be built in the communication network and also makes it a challenge to ensure its reliability.

With respect to access networks, objectives include noise reduction and other improvements in transmission quality, along with accelerating the introduction of fiber optics.

In developing infrastructure in rural areas, important objectives include resolving the issue of regions with no telephones and providing communication infrastructure that contributes to industrial development in the region. Attaining these objectives not only requires a great deal of expenditure, but it is impossible to obtain balanced income and expenditures in the short term through the collection of user fees. Therefore, when implementing these types of measures it is important to make careful and detailed plans that are tailored to the conditions of the recipient country in terms of the pace of implementation, appropriate technology, securing a budget for required expenditures, and the possibility of raising funds for the project.

Mid-term Objective 3-2
Fostering ISPs

Mid-term Objective 3-3
Provision of Access Points

Mid-term Objective 3-2 Fostering Internet Service Providers (ISPs)

Mid-term Objective 3-3 Provision of Access Points

In this area, there are vast differences in needs depending on the development stage of the country and even within the same country the forms of cooperation can be quite different between major cities and rural areas.

For example, in terms of fostering Internet service providers (ISPs), an important objective in countries that are at relatively advanced stages of development or in major cities is to increase the number of access points and accelerate transmission speed. In countries that are at lesser stages of development, however, the government may actually have to take on the function of provider.

In any event, achievement in this area will be measured by the degree to which it is possible to use the Internet.

JICA has considerable experience in developing communication infrastructure, but its share is declining due to the trend of privatization of telecommunications business.

JICA's Activities

JICA's efforts in developing communication infrastructure thus far have included many examples of cooperation as "Telecommunications Network Development Plans" and future activities can continue primarily as an extension of these efforts.

It should be noted, however, that **the percentage represented by this sector in Japan's ODA has been declining because the privatization of the telecommunications business in industrialized nations has also had a great effect on developing countries.** In the future, it will be desirable to have a framework that allows flexible response according to the conditions and needs of the recipient country.

Development Objective 3 Improvement of Communication Infrastructure

Mid-term Objective 3-1 Provision of Communication Infrastructure

Indicators: ①Telephone prevalence rate, ②Number of people able to use the Internet

Sub-targets of Mid-term Objectives	Examples of Activities	Case No.	JICA's Main Activities
Provision of Backbone Network ①Degree of potential communication capacity ②Network reliability	×Introduction of a public communication backbone ◎Increase in communication infrastructure ×Support for the introduction of third generation mobile phones ◎Rehabilitation of old lines ×Installation of VSAT ○Installation of other specific purpose communication networks	44 44, 42 43	Development of telephone networks (Grant Aid/JOCV) Replacement of overhead telephone lines and exchanges (Grant Aid/JOCV) Construction of a network for observation (Grant Aid)
Provision of Access Network ①Transmission quality ②Rate of diffusion of fiber optics	△Promotion of the development of fiber optics ×Installation of Internet Exchanges (IX) ×Support for introduction of IPv6	44	Improvements to telephone network infrastructure (Grant Aid)
Provision of Infrastructure in Rural Areas ①Resolving the issue of regions with no telephones ②Promotion of regional industry	△Increase in telecommunications infrastructure ×Installation of VSAT ×Expansion of communication region through partnerships with the private sector	7, 15	Plans for developing communication networks (Development Study)

Mid-term Objective 3-2 Fostering Internet Service Providers (ISPs)

Indicators: ①Number of people able to use the Internet

Sub-targets of Mid-term Objectives	Examples of Activities	Case No.	JICA's Main Activities
Expansion of Access Points ①Number of access points	×Installation of access points		
High-speed Communication ①Transfer speed ②Areas available with Broadband ③Distance available with Broadband	×Technology transfer of xDSL, FTTH ×Promotion of change to xDSL, FTTH		

Mid-term Objective 3-3 Provision of Access Points

Sub-targets of Mid-term Objectives	Examples of Activities	Case No.	JICA's Main Activities
Provision of Public Access Points ①Number of public access points ②Number of public access point users ③Increase in hours of use at public access points	△Installation of public telephones ×Village phone △Establishment of MCTs (Multipurpose Community Telecenters) △Establishment of Internet kiosks ×Development of IT hardware at public facilities in communities (government agencies and ministries, local governments, educational institutions)	15 7 7	Plans for developing communication networks (Development Study) Promotion of regional expansion of the Internet (Development Study)

Examples of Activities:
◎→JICA has considerable experience
○→JICA has certain experience
△→JICA has experience as a component of projects
×→JICA has little experience

Development Objective 4
Improvement of Efficiency and Effectiveness of Every Sector through the Use of IT

Development Objective 4 Improvement of Efficiency and Effectiveness of Every Sector through the Use of IT

The use of information and communication technology is not limited to industrial sectors such as the electric industry, the software industry, and the communications industry. Through computers and a variety of work systems produced by those sectors, IT is facilitating more efficient office work and activated flow of information through networks inside organizations (intranets) and via the Internet. This facilitation further contributes to rationalization of the work of not only industrial sectors, but also of administrative bodies such as governments and local governments as well as to improving the efficiency of all sectors including agriculture, healthcare and medicine, and education. As for industrial sectors, it is expected that improved work efficiency will increase the international competitiveness of industries and will lead to the creation of new industries.

In using IT, it is clear that simply introducing computers and work systems will not lead to improved work efficiency in administrations and in each sector. When considering the use of IT, it is necessary to proactively introduce IT as one means of improving the efficiency of every sector only following streamlining the work prior to systematization and taking into consideration matters such as the computer literacy of the personnel who will use the system.

This report discusses separately the "Promotion of e-Government," including improving the efficiency of the central government and the digitization of information disclosure and application procedures, and the "Promotion of the Use of IT in Every Sector" in the work front of the public sector and in industry.

Mid-term Objective 4-1
Promotion of e-Government

The maximum potential of e-government is the realization of "e-governance" including participation in policy making and changing interactions between administrative agencies and citizens and the interactions between administrative agencies through the use of IT.

Mid-term Objective 4-1 Promotion of e-Government

Although there is no set definition for the phrase "promoting e-government," the "e-Japan Priority Policy Program 2002" announced by the Japanese government on June 18, 2002 raises the following as specific measures for the realization of an e-government: "electronic delivery of administrative information," "electronic filing of applications and notifications," "digitalization of management of revenues and expenditures," and "electronic government procurement," and "paperless (electronic) administration." Meanwhile, in the "Benchmarking E-government: A Global Perspective – Assessing the Progress of the UN Member States" announced in June of 2002 by the United Nations, assessment was made on such areas as the provision of administrative information, the electronic filing of applications and notifications, and information disclosure.

The UN report also advocates that the **maximum potential of e-government is through "e-governance" in areas such as "participation in**

policy-making" and "changing the interactions between administrative agencies and citizens and the interactions between administrative agencies" through the use of IT. Since e-governance is a wide concept and does not necessarily apply to all types of development assistance, "Using IT as a Means for Citizen Participation in Policy Making" is included here as a sub-target of this Mid-term Objective.

Specifically, IT can be used in administration as follows:

1) As a means of improving the efficiency of internal government processes, work systems can be introduced to improve the efficiency of routine work inside the government and personal computers can be introduced in order to efficiently create the various documents used both inside and outside of the government.
2) By use of electronic filing of applications and notifications, citizens can complete various procedures for the government through the Internet.
3) From the standpoint of good governance, there is a growing demand in many countries for government information disclosure to citizens, and systems can be developed to improve the efficiency of information disclosure.
4) Also from the standpoint of good governance, citizen participation in policy making is needed, and this would be facilitated by gathering and summarizing opinions via e-mail or on websites.

From early stages, governments have used computers for routine work for such processes as accounting procedures and statistical work, and many routine jobs in industrialized nations are carried out through the use of computer systems. Rapidly improving performance and falling prices of computers in recent years have lowered the cost needed to introduce and maintain work systems. In addition, since the cost effectiveness of these systems is relatively easy to see, systems will be introduced first for routine work and for work that can lead to increased revenues.

With respect to the electronic filing of applications and notifications, the first thing that must be done in many cases is to import the existing data into the government system. This is often carried out following improving the efficiency of internal government processes and after disclosing government information on websites.

JICA has frequently cooperated on rationalizing government internal processes, and cooperation involving the use of GIS has increased in recent years.

Meanwhile, since it is not easy to grasp the cost effectiveness of information disclosure and citizen participation in policy making, these areas are often low priorities for the governments.

JICA's Activities

For nearly twenty years, JICA has been carrying out assistance for rationalizing government activities of developing countries. In the field of IT,

this area has been the core of JICA's assistance, along with human resources development. Cooperation on constructing information systems in the field of industrial property rights (patents and intellectual property rights) has been carried out in China, Thailand, the Philippines and other countries since the 1980s. Cooperation involving the use of Geographical Information Systems (GIS) has been increasing in order to efficiently formulate plans such as city planning, river basin management programs, disaster prevention plans, and landmine removal. Introducing the information systems in these fields quickly results in improved work efficiency and the outcome of cooperation can easily be seen. It is therefore expected that this type of cooperation will remain the central focus for JICA in the future.

Cooperation in information systems should be focused on technical guidance prior to introducing the system and advice on the operation of systems created by financial assistance.

However, it is possible that advancements and more widespread use of information systems may result in a situation in which the target of cooperation for developing and providing information systems exceeds the scale of Technical Cooperation Projects. Therefore, **the focus of technical cooperation should be on consulting that includes procedural reviews and human resource development before introducing information systems, cooperation on creating and operating a prototype before introducing the actual system, and advice regarding the operation of systems that are created through financial assistance,** as was the case in the "Institutional and Human Resources Development for IT-related Customs Services Improvement Project in Indonesia" which was carried out by combining Development Study with Loan Aid.

Cooperation involving the use of GIS is found most often as a part of projects for specific fields such as city planning. However, using digital maps created in one field in another can also improve the efficiency of the work. Therefore, **even when cooperation is directed toward a specific field**, it is important to leverage the use of GIS so that it can also be useful to other fields. Since GIS and digital maps have recently come into use in many fields, including education and health care, it is becoming more important to carry out cooperation in terms of both creating digital maps and providing guidance on their use for the countries lagging behind in digital mapping.

JICA has little experience of cooperation in the electronic filing of applications and notifications. In the future, the assistance should target at the fields in which it is easy to see an outcome, such as in electronic procurement, based on progress made in the rationalization and systemization of the internal processes of the recipient governments.

Meanwhile, the use of IT in information disclosure and the promotion of citizen participation in policy making are the area that Japan has also just begun to investigate. Furthermore any assistance in this area needs to proceed with discretion, since it involves the politics of recipient countries. That said, through dispatching advisors at the policy level to sectors such as agriculture and health

care, it will be possible to spread the concept of information disclosure in each sector end then to introduce systems for information disclosure through systemizing the management of internal documents. Also, through disclosure of information and inviting public opinion on websites during Master Plan studies for the formulation of sector-specific development plans, it is possible to demonstrate to the recipient country how citizens can participate in information disclosure and policy making using IT.

Mid-term Objective 4-2
Promotion of the Use of IT in Every Sector

Mid-term Objective 4-2 Promotion of the Use of IT in Every Sector

Using IT makes it possible to improve the efficiency and speed of work in a variety of sectors as well as to expand the content of the work.

Advancements in IT have brought about the development of information systems for not only statistical work and accounting procedures, but for the management of all types of work-related information in a system, in order to improve the efficiency of work in the administrations and companies of industrialized nations. In recent years IT has also been used in “knowledge management” for the sharing and use of knowledge held by individuals and for the creation of new knowledge. In organizations that are advanced in using information systems, a great deal of information flows through information systems, that is becoming so called the “nerve center” of the organizations.

In industrialized nations, the diffusion of the personal computer and the Internet into administrations, companies, and households has led to increased transmission of information by organizations and individuals, and a great deal of information is now available on the Internet. Furthermore the means of distance education have been expanded or changed where there used to be constraints in terms of time and materials. The possible means include video delivery using satellite communications, material distribution (including images) through the Internet, and correspondence education at the university level including the exchange of questions and answers with instructors through the Internet.

In addition, systems are being introduced for forecast of disasters through a network of measurement instruments that are widely distributed in many locations and sectors such as in meteorological observation and river management. They keep possible damage to a minimum by confirming the observed results from those instruments in real time. Even in measuring environmental pollution and managing traffic, the same types of networks (information system) are being introduced to improve the efficiency and speed of work.

The IT literacy of users must be improved in order to promote the use of IT.

The governments of all countries are working on improving the IT literacy of users in order to promote the use of these types of work systems and personal computers.

Meanwhile, little progress is being made in the introduction of information systems in developing countries due to constraints in funding and human resources. So there remain issues such as inefficiency in work and lack

of progress in introducing or using systems for the information sharing. However, in order for developing countries to make advancements it is unthinkable not to use information systems (though the degree of use is a separate issue) and it is necessary to consider the use of information systems in improving organizational efficiency and in sharing and using information.

Finally, the concept of "digital opportunity" maintains that introducing state-of-the-art IT will enable developing countries to shorten the time required to catch up with industrialized nations, so it has become necessary to investigate "appropriate technology" taking the latest technology into consideration.

Use IT for many types of cooperation in various sectors.

JICA's Activities

Computers and information systems are considered to be important means for carrying out efficient work and for storing and using information in fields of cooperation outside of the IT sector such as agriculture, health care and medicine, transportation, and mining and manufacturing. For that reason, JICA is using IT in many of its projects.

There are projects that have the introduction of information systems as their main objective, for example the "Improvement of the Customs System" project in Indonesia (Development Study, started in 1997) and the statistical projects in sectors such as population, agricultural and industrial production, and trade, and the projects related to managing industrial property rights.

E-Learning using JICA-Net and publication of achievement on the website

The use of IT in education and training (e-Learning) includes the two aspects: TV conferencing, TV lectures and video delivery; and creating electronic educational materials. With respect to the former, JICA has been carrying out cooperation using JICA's showcase JICA-Net and cooperation to the University of the South Pacific. JICA-Net is used not only by JICA, but also for seminars sponsored jointly with other organizations such as the World Bank.

As for the latter, educational materials and reports that have been created are gradually being published on the website[7], as was seen in the "Kenya Population Education Promotion Project" where the publication of educational materials on the web was one of the major points of cooperation. Most educational materials are now being created on computers, and it is therefore easy to publish them on websites if they are text-based. To promote this even further and to make it possible for an even broader population to learn from websites, the proper preparations must be made. For instance, it is necessary to create a suitable structure for self-instruction by incorporating such elements as quizzes that can confirm the degree of learning. Even so, reducing the constraints of time and distance will enable the use of educational materials by a broader population will lead to an increased impact of cooperation. The creation of electronic education materials is also thought to be effective from the

[7] As of December 2002, 36 projects have been linked to JICA's website (including completed projects).

perspective of publicizing the impact of cooperation. Therefore, JICA should further carry out as one of the pillars of cooperation the production of educational materials for self-instruction and the proactive publication of those materials on websites.

In projects such as the "China Environmental Information Network Development Project," "The Project for Improvement of the Earthquake and Volcano Monitoring System in the Philippines," "The Project for Rehabilitation of the Effective Flood Control Operation and Warning System in Metro Manila (Development Project)," and the "Upgrading of Meteorological Observation and Forecasting and Environment Monitoring in Mongolia" and in other river basin management programs, JICA is carrying out assistance in partnership with Grant Aid cooperation to link regional bases into a network to gather observation results and provide information.

Even when the use of IT is not a main objective, many projects still have the introduction of computers and networks as one of their required conditions. IT is being used in a variety of sectors, such as the use of GIS in cooperation in mineral resource surveys, disaster prevention plans, city planning, school construction plans, and in landmine removal, and through the computerization of irrigation water management and computer management of shipment to markets.

Development Objective 4 Improvement of Efficiency and Effectiveness of Every Sector through the Use of IT

Mid-term Objective 4-1 Promotion of e-Government

Indicators:①Plans for using IT in governments

Sub-targets of Mid-term Objectives	Examples of Activities	Case No.	JICA's Main Activities
Electronic Filing of Administrative Procedures ①Number of application and notification procedures available online ②Introduction of electronic bidding	×Support for electronic filing of application and notification procedures ×Support for introducing an electronic bidding system		
Streamlining of Government's Internal Processes ①Degree of diffusion of networks between government agencies ②Systemization of administrative work	◎Support for development of administrative systems (e.g. intellectual property rights) ◎Provision of OA equipment ○Support for creating land and regional information using GIS ×Technological support for e-voting	46, 58, 59, 61 63, 56 56, 62, 71	Intellectual property rights (Technical Cooperation Project, Development Study) Provision of equipment and materials (Technical Cooperation Project) Creation of topographical maps and river basin information (Development Study)
Promotion of Information Disclosure ①Number of disclosed information items ②Of the above, the number of digitized items	×Proactive publication of project information ×Research into examples of countries that are advanced in information disclosure		
Citizen Participation in Policy Making	×Citizen participation in development studies ×Proactive publication of the activities of policy advisors		

Mid-term Objective 4-2 Promotion of the Use of IT in Every Sector			
Sub-targets of Mid-term Objectives	**Examples of Activities**	**Case No.**	**JICA's Main Activities**
Promotion of e-Learning ①Rate of diffusion of e-Learning	◎Use of JICA-Net ○Provision of equipment and materials for distance education	72 57, 73	University of the South Pacific (Technical Cooperation Project)
Support for Content Creation	○Support for using IT in educational materials	32	
Promotion of the Use of IT as a Tool for Statistics and Analysis	○Support for developing systems for statistics and analysis ×Support for improving the IT literacy of users ◎Use of JICA-Net	51, 66 72	Population statistics (Development Study) Various schemes
Other Specific Use of IT	×Creating networks for food sanitation and safety ◎Remote sensing (GPS, GIS) ◎Disaster warning systems Distance medicine Environmental monitoring ○Other	 45, 49, 67, 69 43 47, 48, 50	 Resource surveys (Training/Technical Cooperation Project) River basin information system (Grant Aid)

Examples of Activities:
◎→JICA has considerable experience
○→JICA has certain experience
△→JICA has experience as a component of projects
×→JICA has little experience

Development Objective 5
Improvement of Efficiency and Effectiveness of Development Assistance through the Use of IT

Development Objective 5 Improvement of Efficiency and Effectiveness of Development Assistance through the Use of IT

Using IT can improve the efficiency of communication and procedures in any sector. Similarly, in development assistance as well, it can improve the efficiency of technical transfer and training by experts. By using IT, know-how about preparations and results of cooperation projects can be accumulated and provided to related parties in an easy-to-search form. The use of IT is something that can contribute both directly and indirectly to assistance activities.

Mid-term Objective 5-1
Dissemination and Transfer of Existing Knowledge

Mid-term Objective 5-1 Dissemination and Transfer of Existing Knowledge

In order to disseminate and transfer existing knowledge, it is necessary to **"digitize skills and knowledge" and then "disseminate and transfer knowledge through distance training."**

Since digitized data can be revised much more efficiently than analog materials, they offer the advantage of making it easier to refer to knowledge obtained in various situations. In the same way, content is more easily updated.

After digitizing skills and knowledge, disseminate and transfer knowledge through distance training.

Since advancements in technology have made it possible to process voice and image data on relatively inexpensive computers, digital skills should be adopted when creating educational materials. Also, even in cases in which computers are not networked, digitization of resources should be promoted with a prospect of networking in the future.

It is also possible to improve overall efficiency by adopting distance training using IT at the stage of dissemination and transfer of digitized skills and knowledge. Indicators to measure the dissemination and transfer of knowledge through distance training can include the number of conducted distance courses and seminars and the number of web-based training (WBT) courses. It is becoming more and more common to conduct WBT that includes a learning management function in order to disseminate skills and knowledge through distance training, aside from the simple provision of educational materials.

Dissemination and transfer of knowledge through distance training have the advantage of reducing physical and time constraints over the old face-to-face style of training. By utilizing this advantage, the task can be carried out more efficiently as an alternative or complement to the Dispatch of Experts.

Use JICA-Net and create digitized educational materials.

JICA's Activities

JICA's main efforts toward this mid-term objective are centered on JICA-Net. JICA-Net is a framework for carrying out distance technical cooperation. In addition to a TV conference system it has an e-Learning system (with a learning management function) and these can be used separately or together.

JICA is also making progress in creating digitized educational materials for each project. Digitized educational materials have been created for projects that support the use of IT in education, including e-Learning, and for projects to assist R&D, and many of them have been delivered on networks. As these educational materials are able to be distributed much more broadly than the previous analog educational materials, they are always available both inside and outside of projects. Even in projects in sectors such as health care and agriculture that do not have IT as a direct goal, it is becoming common to use computers when creating materials for dissemination and education, for example in printing production work or in digital video programs.

Mid-term Objective 5-2
Sharing and Creation of Knowledge and Experience

Mid-term Objective 5-2 Sharing and Creation of Knowledge and Experience

This Mid-term Objective and Mid-term Objective 5-1 have many common features.

Sharing existing content with other donors and developing countries is one method of widely and efficiently using existing experience and knowledge. Also, when content has been digitized it is also more easily copied for use.

Share, develop, and create content through the use of IT.

At the same time, exchanging and revising data is facilitated through the use of IT, and this makes it possible to jointly develop content in an effective and efficient manner with other donors and developing countries.

Finally, using IT not only makes it possible to share existing content, but

also enables us to partner with other donors to create new knowledge. Workshops and conferences with other donors and developing countries through TV conferencing increase interactive communication and allow enhanced discussions without the restrictions of time or space.

JICA's Activities

At JICA-Net, JICA is partnering with the World Bank to create training materials regarding project evaluation for the staff of development assistance organizations.

In addition, JICA-Net is being used between such organizations as the World Bank and the United Nations Development Programme (UNDP), for joint convening of distance workshops between donors and for discussions on collaboration with other donors.

Mid-term Objective 5-3
Use of IT in Project Implementation

Accumulate and share knowledge and know-how and improve the efficiency of work through the use of IT.

- Introduction of knowledge management systems
- Briefings and training for the overseas offices through JICA-Net

Mid-term Objective 5-3 Use of IT in Project Implementation

In order to effectively utilize knowledge and know-how when implementing projects, knowledge should be first accumulated, and then systematically organized, classified, and appropriately presented. By using IT, the accumulation of knowledge and know-how has become an easier task. This has also made the systematic organization and publishing of accumulated information more efficient than ever before.

Looking at JICA's projects, it has become easier to obtain useful information for reference in all of the processes from project formulation to implementation and evaluation by sharing various examples of past activities. In addition to these, by combining distance discussions and consultations through TV conferencing with the dispatch of study teams, the efficiency of work can be improved.

JICA's Activities

JICA has brought in knowledge management systems, and is making efforts in the systematic organization of knowledge and know-how of every sector and every issue.

There are increasing numbers of distance discussions and consultations, and JICA-Net is being used in briefings with overseas offices prior to or following the dispatch of study teams as well as to prepare for international seminars.

Furthermore, interviews with overseas experts, training for overseas office staff, and seminars on health care management are also being carried out via JICA-Net.

Development Objective 5 Improvement of Efficiency and Effectiveness of Development Assistance through the Use of IT

Mid-term Objective 5-1 Dissemination and Transfer of Existing Knowledge			
Sub-targets of Mid-term Objectives	**Examples of Activities**	**Case No.**	**JICA's Main Activities**
Digitization of Skills and Knowledge ①Increase in and improvement of digitized educational materials	○Packaging of educational materials through JICA-Net ○Systemization of sector-specific knowledge ○Creation of digital educational materials for each project	72	JICA-Net JICA Knowledge Management
Dissemination and Transfer of Knowledge through Distance Training ①Number of distance lectures and seminars ②Number of WBT courses held	○Dissemination and transfer using remote methods (including JICA-Net) ◎Courses using TV conferencing ×Creation of a library on the Internet ○Web Based Training with learning management function	72,73 72 32	Intellectual property rights (Technical Cooperation Project, Development Study) Provision of equipment and materials (Technical Cooperation Project) Creation of topographical maps and river basin information (Development Study)

Mid-term Objective 5-2 Sharing and Creation of Knowledge and Experience			
Sub-targets of Mid-term Objectives	**Examples of Activities**	**Case No.**	**JICA's Main Activities**
Sharing of Knowledge and Experience	×Sharing of existing content with other donors and developing countries ○Joint development of content with other donors and developing countries	72	Monitoring and evaluation (with the World Bank)
Joint Creation of New Knowledge	×Convening opportunities for joint creation between donors (such as workshops) through distance technology ×Partnership discussions with other donors ×provision of opportunities for sharing experiences between developing countries ×Joint research between school networks ×Holding distance global dialogue		

Mid-term Objective 5-3 Use of IT in Project Implementation			
Sub-targets of Mid-term Objectives	**Examples of Activities**	**Case No.**	**JICA's Main Activities**
Systematization of Knowledge and Know-how	○Systematization of sector-specific knowledge		JICA Knowledge Management
Distance Discussions and Consultations	◎Consensus-building through TV conferences	72	JICA-Net

Examples of Activities:
◎→JICA has considerable experience
○→JICA has certain experience
△→JICA has experience as a component of projects
×→JICA has little experience

Chapter 3 JICA's Cooperation Policy

Basic Cooperation Policy:
- Keep in mind the digital divide and digital opportunity
- Carry out cooperation tailored to the conditions and development stages of each country
- Support sectors in which JICA's cooperation can have a major impact within the international framework
- Secure human resources and comprehensively combine schemes
- Partner with Loan Aid, the private sector, and NGOs

Points of Concern:
- Formulate projects after confirming their significance in the development plans of the country
- Deal with counterpart job turnover
- Partnership between industry, government, and academia
- Ensure a framework for updating hardware and software

3-1 JICA's Priorities and Points of Concern

This section is a discussion of important areas for future JICA activities in each of the Development Objective areas based on JICA's track record of assistance thus far in each of the areas.

Following are the basic strategies:

- **Always keep "elimination of the digital divide" and "digital opportunity" in mind when carrying out cooperation.**
- **According to the conditions and the stage of development of the individual region or country, give consideration to sustainability and take an approach that is tailored to needs and priorities.**
- Carry out cooperation for sectors in which JICA's cooperation can have a major impact within the framework of international aid coordination and the direction of cooperation with international organizations and bi-lateral donors.
- **Endeavor to secure human resources** who have the skills and know-how necessary for the cooperation in IT **and carry out cooperation comprehensively combining all types of JICA's schemes.**
- **Form partnerships between JICA's technical cooperation and Loan Aid Cooperation, Grant Aid Cooperation, and activities from other official flow (OOF), the private sector, and NGOs.**

The following are common points for consideration in each of the Development Objectives:

- **When formulating specific projects, identify the relative significance of those projects within the overall development plans or industrial plans of the recipient country.**
- Since there is an extreme shortage of human resources in the field of information and communication technology in developing countries, job turnover on the counterpart side is a common problem. It is difficult to keep professionals from moving on to new jobs, but it is necessary to form a framework in which counterparts can still be involved with projects even if they have changed jobs.
- In the field of IT, since partnership with the industrial sector is indispensable in addition to that between government agencies and universities, it is necessary to promote government-industry-academia

partnerships and the introduction of IT from industries.

- Keeping in mind economical efficiency, it is important to introduce low cost hardware and consider the use of open source software and to secure a system for updating hardware and software as needed once every three to four years.

Development Objective 1
Strengthening Capacity for IT Policy Formulation

Priority Objectives vary depending on the stage of privatization of the telecommunications business.

Development Objective 1 Strengthening Capacity for IT Policy Formulation

Priority objectives vary depending on the stage of privatization of the telecommunications business. In particular, in countries at the "low stage" telecommunications services are provided by state-owned enterprises, and there is a greater need to place more emphasis on supporting the operation of and ensuring the sound management of state-owned enterprises in order to promote the development of telecommunications infrastructure required for the advancement of the IT industry.

Meanwhile, for the countries that are at the "intermediate" or "high" stage of privatization, it is necessary to carry out support for formulation of comprehensive IT policy including promotion of the development of rural infrastructure, user protection and fostering of the IT industry, and the cooperation should be aimed at developing industrial activities by the private sector.

Points of Concern

For Development Objective 1, JICA has experience of the Dispatch of Experts as advisors to the related ministries and agencies of countries and

Table 3-1 Priority Areas at Each Stage of IT Policy

	Stage of Privatization		
Mid-term Objectives	Low	Intermediate	High
1-1 Establishment of Telecommunications Policy	Operational support for state-owned enterprises	Regulation of monopolistic private sector providers	Introduction of market principle
1-2 Establishment of Policy to Foster IT Industry			Policies that foster industry Intellectual property rights protection system
1-3 Establishment of Policy to Eliminate Domestic Digital Divides	Policies to improve IT literacy / Policies to promote development of rural infrastructure		
1-4 User Protection		Development of laws to protect users / Establishment of dispute settlement organizations Administration to support user education	

Development Studies on support for formulating master plans for developing infrastructure. However, Development Studies have been conducted from the technical perspective of infrastructure development as the teams implementing studies have been mainly made up of engineers, and thus they have not been able to sufficiently support policy making. Consequently, in most cases, the area of policy has only been partially addressed. Since domestic human resources for this area are limited to related government agencies and think tanks, it will be practicable to meet the needs by making use of those limited resources mainly through Dispatch of Experts, Acceptance of Trainees, and Seminars.

In the field of information and communication technology it is essential to continue keeping up with the rapid advancements. With respect to support for the formulation of IT policies in developing countries, it is important to analyze policies and measures of Japan based on the e-Japan strategy and the policy trends and successful cases in other developed and developing countries, thereby to provide advice on effective policies that meet the conditions of the recipient country.

In the future, it is possible to conduct Development Studies specialized to support the formulation of master plans for IT policies. Therefore, it is necessary to establish a system to make use of those human resources who have actual administrative experience in think tanks, ministries, international organizations and educational institutions. It is quite possible to utilize, in part, consultants from other developed countries.

Development Objective 2
Human Resources Development in IT

Development Objective 2 Human Resources Development in IT

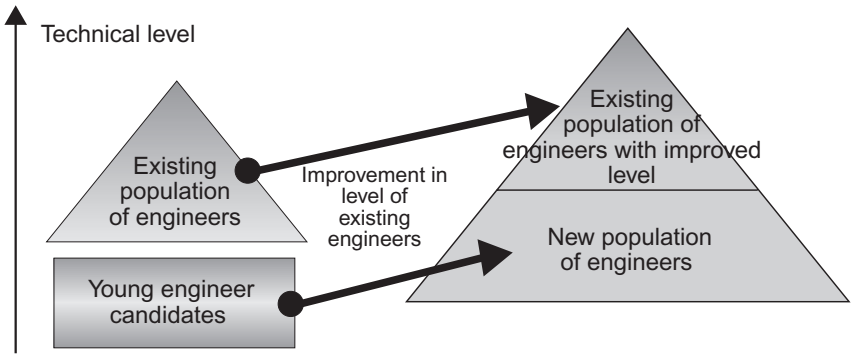
- Support for building systems and mechanisms to develop key persons in promoting IT and the formation of training curricula and educational materials
- Disseminate outcomes of successful cases
- Make quantitative and qualitative improvements of engineers

Most of JICA's previous projects in the field of IT have been carried out with the aim of developing human resources for IT, and IT human resource development has become the mainstream of JICA's cooperation in the field of IT. In the future as well, it is important to **develop key persons to promote IT** in each country, and to guide countries in the establishment of frameworks to continue promoting the human resources development in IT under their own efforts. Specifically, plans aimed at developing personnel to play leading roles, such as policy makers, IT engineers, educators, researchers and instructors, are needed. JICA should therefore support **the establishment of necessary systems and mechanisms** for promoting the human resources development in IT in each country and **the creation of training curricula and educational materials**. When doing so, it is desirable to extend support to make integral policies covering from the development of policy makers to the improvement of IT literacy for as many citizens as possible. Also, it is important to **use examples of success as model cases and to spread and promote these outcomes in every country and region.**

In developing human resources, **the primary objective is to increase the number of engineers who are active in society and at the same time to improve their quality.** Therefore, it is important to improve the level of the existing engineers, and to focus on the development of new human resources at the stage of higher education and vocational education, by targeting young people.

JICA's Cooperation is mainly carried out through Technical Cooperation Projects, Dispatch of Individual Experts, Dispatch of Volunteers, and Acceptance of Trainees, with a focus on software-oriented cooperation. Technical cooperation partnered with Grant Aid Cooperation should also be strengthened in order to develop and upgrade IT training facilities and equipment. At the same time it is expected to consider the effective utilization of existing facilities.

Figure 3-1 Increase in Numbers of Engineers and Improvement in Overall Technical Level



Meanwhile, cooperation required at the administrative agencies and educational institutions will be to spread and promote specific technical skills relevant to recipients. It is therefore expected that in this area Dispatch of Volunteers will take the place of Dispatch of Experts because it will be necessary to strengthen approaches combined with human resource development at the grass roots level.

Conversely, it is expected to educate policy makers in the recipient countries through Dispatch of Experts as advisors who have sufficient theory and experience to give practical advice.

Points of Concern

- Developing policy makers is more delicate than developing engineers because policy can be assessed diversely as opposed to technology, for which there is a clear right or wrong.
- Resources in Japan are limited to government agencies such as MPHPT and METI.
- Depending on the social systems, customs, and basic policies of the recipient country, simple application of Japan's model may not produce

a sufficient outcome and even more, there is also a possibility to cause opposition against the cooperation. **Therefore, it is necessary to construct assistance programs that are tailored to the conditions of each country and to be flexible in making changes where necessary.**

Development Objective 3
Improvement of Communication Infrastructure

Important points are the development of a backbone network and an access network. Particular consideration should be given to supporting the development of infrastructure in rural regions in countries that are at low stages of development.

Development Objective 3 Improvement of Communication Infrastructure

For the improvement of communication infrastructure, priority are given to building a backbone network and an access network, the main content of Mid-term Objective 3-1 Provision of Communication Infrastructure. IT makes people's lives more convenient when it is introduced into the public sector, enriches people's lives when it is introduced into social sectors such as education and health care, and holds the potential for contributing to poverty reduction and improved women's status. Conversely, negative aspects have also become strongly recognized, such as the fact that a tremendous amount of effort is needed to eliminate the digital divide and obtain digital opportunity. Improvement of communication infrastructure becomes an indispensable prerequisite for realizing the positive potentials and for improving the negative conditions mentioned above.

There are vast differences in the development stages between countries, but **in countries that are at relatively low stages of development it is especially important to take into consideration cooperation for developing infrastructure in rural regions**. Aside from the obvious goal of eliminating the digital divide, this point has also become worldwide emphasized from the perspective of Basic Human Needs (BHN). Meanwhile, in developing infrastructure in rural regions, despite the fact that it is basically impossible to recover capital expenditure through user fees, actual conditions in a country only allow for the allocation of an extremely insufficient budget amount. Consequently, this is one area in which there is a high potential need for ODA.

Furthermore, **it is necessary to uncover the real needs for the improvement of communication infrastructure in less developed countries by careful approaches.** The trend of privatization of the telecommunications business that started in industrialized nations has been adopted even in developing countries as an almost definitive direction, and as a result the track record of ODA in the field of telecommunications has declined dramatically. However, not all of the developing countries are headed in the direction of complete privatization, and it is important to carefully examine the possibilities for cooperation through various schemes and degrees. This Development Objective is considered to be the most important from the perspective of infrastructure in order to develop an information society in developing countries and regions.

Points of Concern

- Development of communications infrastructure requires a substantial amount of funds and the national budget allotted by the developing country itself is not at all sufficient in most cases. For that reason, when planning cooperation in this field it is necessary to **give adequate consideration to financing plans**.
- It is necessary to make efforts to **suggest how to shift towards self-supporting maintenance and management**.
- In countries that are at relatively low stages of development, there is a particular need for reasonable plans regarding development of infrastructure in rural regions.
- **Assistance should be carried out with a close eye on the direction of new technologies** (including shift from wired to wireless, higher speed lines, smaller and lighter terminals, cost reduction etc.)

Development Objective 4
Improvement of Efficiency and Effectiveness of Every Sector through the Use of IT

In promoting e-government, focus on systematization of work and digitization of procedures.
In promoting the use of IT in every sector, support e-learning and content creation and the use of IT as a tool for statistics and analysis.

Development Objective 4 Improvement of Efficiency and Effectiveness of Every Sector through the Use of IT

Improving the efficiency of budget allocation and expenditure management is important from the perspective of the efficiency of administrative agencies. In developing countries, where there tend to be budget shortfalls, understanding the situation of budget execution is important not only from a budget management standpoint, but it is also expected that clarification of expenditures will result in control of inappropriate expenditures. It also makes it possible to gain an understanding of the expenditures dispersed in individual projects, and it will therefore facilitate project evaluation.

When changing over to “electronic filing of administrative procedures” in the “promotion of e-government,” the administrative work first should be systematized. “Information disclosure” and “citizen participation in policy making” are areas that should be given attention in project planning.

Cooperation to improve the work of administrative bodies using IT started from the first half of the 1980s in the form of providing computers and system development for statistics and patents (industrial rights), and this type of cooperation, along with human resource development, has become the focus of cooperation.

In recent years, there have been projects improving the work of various fields and progjects using IT in disaster prevention and planning of countermeasures, since it has become possible to carry out real time monitoring of rainfall, river flow rates, and environmental pollutants using communication technology such as the Internet. In the future as well, IT should be proactively used in various types of cooperation in all administrative sectors.

In order to promote the use of IT in the private sector, what is needed is balanced technical cooperation for: the establishment of systems to promote information system development in private companies (Development Objective 1); the development of human resources and organizations of both the system engineers and the users (Development Objective 2); and the improvement of telecommunications infrastructure (Development Objective 3).

Recently GIS has come to be adopted in sectors such as education and health care that have not traditionally used GIS. The range of uses for digital maps has thus become broader, there is an increasing importance of carrying out cooperation in guidance on using and creating those maps in countries that are lagging behind in digital mapping.

It is expected that distance education via the Internet will allow efficient re-training of engineers working in various places in rural areas and the use of e-mail and electronic bulletin boards will facilitate even more active information exchange between engineers. In cooperation for the institutes or organizations where training for engineers is conducted, JICA should consider adopting web-based training and after care through mailing lists and electronic bulletin boards for those who have completed training course. In other projects as well, the outcomes of cooperation should be publicized through publishing reports and other means, proactively utilizing websites for the project itself and websites of the counterpart organization.

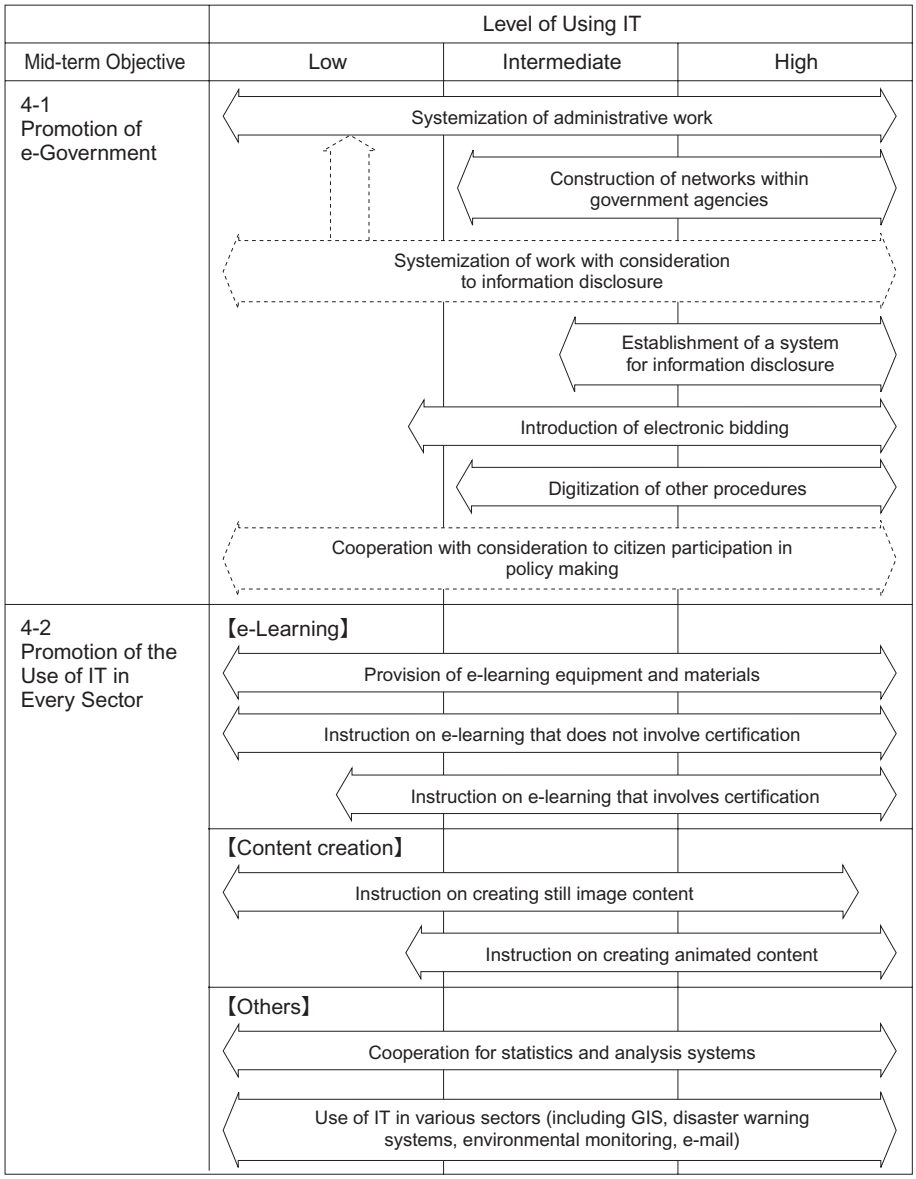
Points of Concern

- IT should be proactively used as a means for improving the efficiency and transparency of the government work of the recipient country. However, considering the scale of cooperation (funding), technical cooperation should focus not on the development of systems themselves, but on work improvements before systematization and system improvements such as the creation of prototypes as well as on the after care for maintenance and operation of introduced systems. It is necessary to keep in mind that the allocation for operational funding following the start of operation will be the prerequisite when introducing and updating major systems and equipment.
- In technical cooperation old generation technology has been often adopted according to the technical level and funding level of the recipient country from the perspective of "appropriate technology." However, in the field of IT, there are cases in which the latest technology is the least expensive and the most efficient, and therefore cooperation should also proactively adopt cutting edge technology while carefully considering the trends in technology.
- In the field of IT, equipment becomes obsolete very quickly, and therefore it is important to choose equipment architecture and system

configurations that allow the recipient country to carry out updates by themselves after the end of cooperation.

- In cooperation to introduce information systems, it is important not to create everything from the ground up, but to give consideration to introducing package systems that are already being used in other countries or to reducing independent development by combining general purpose systems.
- IT is useful not only in improving the efficiency of government organizations, but also for the private sector and of NGOs. JICA therefore should consider expanding the IT training centers to which JICA has already extended cooperation and adding a consulting function for the private sector and others.

Table 3-2 Cooperation for Every Sector according to the Level of using IT



Development Objective 5
Improvement of Efficiency and Effectiveness of Development Assistance through the Use of IT

Use of JICA-Net and computerization of project content, accumulation and organization of knowledge for knowledge management systems

Development Objective 5 Improvement of Efficiency and Effectiveness of Development Assistance through the Use of IT

Under this Development Objective **expansion of the network for delivering educational materials with a focus on JICA-Net** should be undertaken.

JICA should create new content to be delivered and also revise existing one, adopting systematized material development for efficiency and effectiveness. When developing new content, related information should be accumulated so that it can be shared in the future. With respect to improving and revising existing content, excellent content in analog-format should be digitized and more effective and efficient content should be produced on the basis of the results of their use to date.

Furthermore, **information should always be digitized** in every project, necessary equipment for this should be provided, and the database should be improved in order to collect, organize and integrate newly created content and make it easy to use. The database should be a place to accumulate information regarding content designs and examples of its use and it should allow the broad use of all of this and other related information.

It is also necessary to create an environment in which joint development of content in similar fields can be carried out between donors and developing countries.

Finally, **it is also essential to systematize sector-based information in the knowledge management system** that is in operation at JICA.

Points of Concern

- It is important to systematically understand the intellectual property rights associated with the materials, technology, and know-how for creating content and as well as the **costs associated with intellectual property rights that occur when distributing content.**
- **Ensure the availability of instructors with the ability to deliver distance lectures in English or other foreign languages.**
- **JICA's content should be created in various non-English languages** in order to widen the range of its use.
- The efficiency of distance cooperation should be confirmed by comparison with face-to-face cooperation in the cost-effectiveness. Meanwhile it is important as well to study the effective combination of these means.

3-2 Issues to be Considered for Future Activities

(1) Assistance to Privatized Enterprises

Privatization of the telecommunications business has become the general direction in industrialized nations and is also becoming a common trend in developing countries. Meanwhile, in the current mechanism for ODA, there are great difficulties associated with providing cooperation to privatized business entities. So the task at hand is to consider the introduction of a flexible framework that would make it possible to provide cooperation even for the privatized enterprises, based on the needs from the viewpoint of importance of social benefit or the difficulty as profit-based businesses.

(2) Need for a Unit to Promote the use of IT

In each development assistance organization the question of "how to incorporate IT into assistance" has been a matter of concern. For JICA as well, it is essential to establish a specialized unit to promote the use of IT and to aim for effective use of IT. This unit would summarize the current use of IT in various sectors and schemes and introduce examples of use to all departments. Also, based on activity cases of JICA and other assistance organizations, it is expected to introduce new means to utilize IT, to design application of good practices in other sectors, as well as to advise for the projects planning and implementation.

(3) Strengthening Distance Technical Cooperation

IT is advancing rapidly and all types of information are being digitized. JICA and other donors are now looking into ways to effectively and efficiently use these technologies and information. Among these, distance technical cooperation is especially gaining recognition, as the opportunities for using it have increased, and the development and use of distance lectures, e-learning, and WBT content and methods are becoming an important area.

There is a need for the future to organize and assemble content that has been developed through these types of distance technical cooperation and to construct a mechanism for the joint use of content in further projects. Therefore, an issue for consideration will be the application of content over a wide region, such as in the development of human resources in the field of IT throughout Asia.

Appendix 1 Major Activity Cases

JICA's menu of cooperation in the field of information and communication technology includes Acceptance of Trainees and Dispatch of Experts as Advisors, Development Studies, Technical Cooperation Projects, and the Dispatch of JOCVs (Japan Overseas Cooperation Volunteers) (for a list of major cooperation projects, see the chart entitled "Relevant Projects in the Field of IT"). The following is a description of JICA's main operations and their characteristics.

JICA Okinawa International Centre – Information Processing Personnel Course

1-1 Training at the Okinawa International Centre – Information Processing Personnel Course

This section introduces the Information Processing Personnel Course, a typical example of the various types of training JICA is conducting related to information and communication technology

1-1-1 Background

The Information Processing Personnel Course was launched in FY1985 and has undergone revisions every four years, with 9 types of courses held 12 times a year. Initially, courses used host computers (mainframes), but over the years there has been a shift and currently client server systems are used. In addition, as the Internet has spread worldwide, the need for training in that area has increased, and starting in FY2001, the Centre has added a new course on Web applications and has been increasing its training on technology related to the Internet in every course subject.

1-1-2 Goal of Training

The goal of training is to develop engineers who will be engaged in the development and operation of information systems that are actually used in the field in developing countries.

1-1-3 Course Curriculum

Currently, 9 types of computer courses are held 12 times a year, and in them approximately 140 IT professionals in total are trained every year including: network engineers, web designers, database engineers, system analysts, IT administrators, and IT instructors. Also, MTEC (Multimedia Technology for Education and Communication) trains approximately 25 people

every year in fields such as Multimedia Production for Education and Digital Video Production. The curriculum is established in order to develop engineers and designers who understand overall systems, and for that purpose the subjects taught include a good balance between design, management, and operation. In principle, the aim is to have students acquire general skills that are not dependent on specific software packages or hardware types, and the focus is on a curriculum that emphasizes practical training and exercises. Following is a list of the names of the training courses and the frequency with which they are conducted.

1) IT Administrator (1x/yr)
2) System Analyst (2x/yr)
3) Network Engineer (1x/yr)
4) Database Engineer (1x/yr)
5) Client Server System Designer (UNIX) (1x/yr)
6) Client Server System Designer (PC) (1x/yr)
7) Web Application Server System Designer (2x/yr)
8) IT Instructor (1x/yr)
9) PC Application Designer (1x/yr)

Human Resources Development Projects

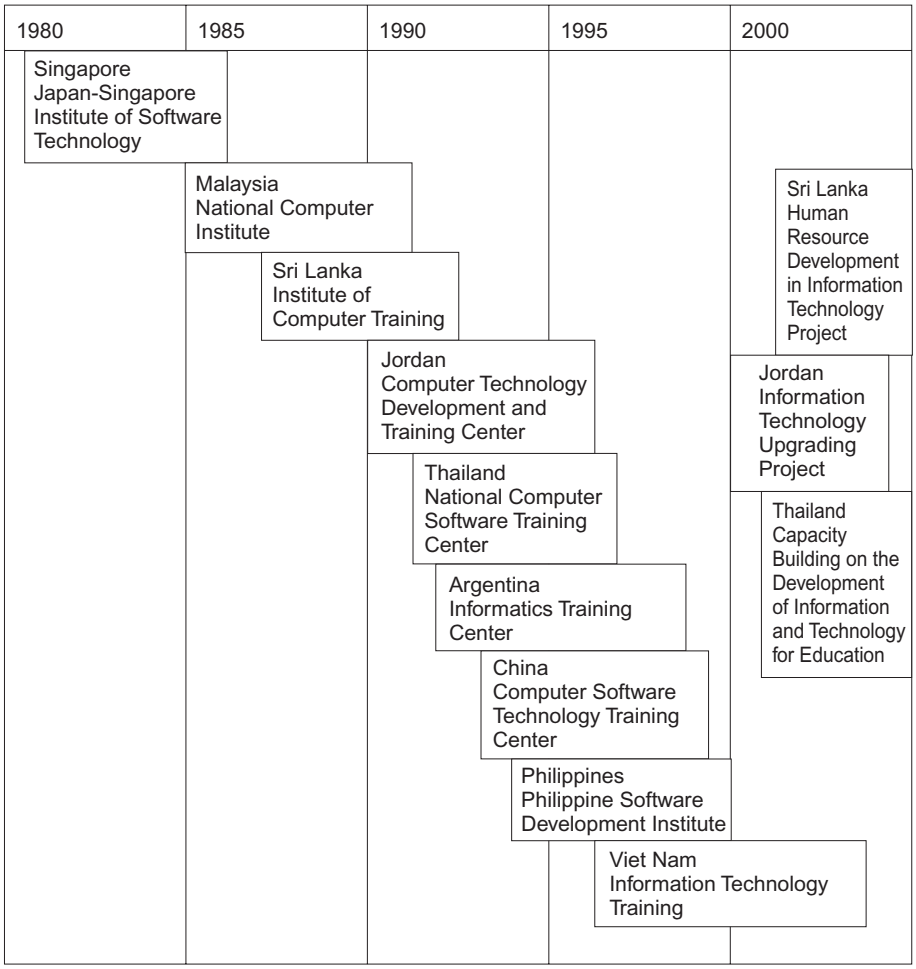
1-2 Human Resources Development Projects

JICA has carried out numerous human resource development projects that meet the needs and level of the recipient country and that are tailored to the technology of the particular period of time, and has contributed to improving IT literacy and eliminating the digital divide (Figure A1-1). In addition to the projects that are currently in progress in Sri Lanka and Thailand, future plans include projects in Myanmar and the Philippines. Characteristic of recent projects is the development and use of educational materials that are available on the Internet, such as in the “Capacity Building of the Development of Information and Technology for Education” in Thailand, and the “Human Resource Development in Information Technology Project” in Sri Lanka. Also, planned projects in Myanmar and the Philippines include content that meets specific needs, such as the hands-on technical transfer of skills that will be useful in competing in the industry. JICA also plans to tackle such issues as the sharing of IT educational materials between projects that are being carried out simultaneously; including JICA Headquarters, coordination between projects through the use of JICA-Net (described later), and the conducting of follow-up on completed projects through the development of educational materials.

In addition, while they are not listed in Figure A1-1, JICA is also assisting projects with high level, specialized content such as in assistance in the creation of IT and electronic engineering curricula for higher education in Poland

through the "Polish-Japanese Institute of Information Techniques" and in Thailand through "Research Center for Communication and Information Technology, King Mongkut's Institute of Technology, Ladkrabang."

Figure A1-1 Trends in Human Resources Development Projects



JOCV and Senior Overseas Volunteers

1-3 Japan Overseas Cooperation Volunteers (JOCV) and Senior Overseas Volunteers

As of September 2002, 784 JOCVs and Senior Overseas Volunteers have been dispatched to 68 countries in the field of computer skills related to IT (including former system engineers and computer engineers), and they are in charge of individual projects. Many are assigned to universities where they train instructors and assist with the creation and update of curricula or are posted in government agencies where they provide assistance with the development of work systems. In this way, they are contributing to the development of human resources in IT and improved efficiency and effectiveness through the use of IT.

Also as of September 2002, 296 volunteers have been dispatched to 29 countries to do jobs related to telephone lines and telephone exchanges, and are

contributing step-by-step to the development of communication infrastructure. In recent years, however, the requests received for this type of work are declining with increasing privatization of state-owned telephone companies. So far 24 computer engineer volunteers have been dispatched to the ministries of the central government of Bhutan, and they are carrying out cooperation in constructing database systems.

JICA-Net

1-4 JICA-Net

1-4-1 Background

"Japan's Comprehensive Cooperation Package to Address the International Digital Divide" was announced at the Kyushu-Okinawa Summit held in July 2000, and it stated that Japan would carry out cooperation in the field of IT.

One of the methods for cooperation announced was the intent to establish IT satellite centers in developing countries as a means of realizing "digital opportunity" in order to promote the use of IT in development assistance and at the same time it stated the aim of establishing a core center in Japan with the function of knowledge base.

By utilizing these IT centers, it is thought that Japan will be able to realize the input of assistance resources without being constrained by time or space and that it can meet the diverse needs of developing countries and improve the efficiency and effectiveness of technological cooperation through the delivery of content that makes it possible to effectively and efficiently transmit know-how.

1-4-2 Goal of Introducing Distance Technical Cooperation

JICA's traditional technical cooperation has been carried out either by accepting trainees from developing countries to Japan where they have taken lectures or practical training directly from instructors, or by dispatching technical experts from Japan to developing countries. In this way, face-to-face technical transfer has been the mainstream.

JICA has now added to this face-to-face style of technical cooperation the concept of "distance technical cooperation," or technical cooperation that uses distance learning methods, in its framework of technical cooperation.

By introducing distance technical cooperation, JICA expects to see the following:

1) Using IT in carrying out assistance will promote the use of IT and formation of networks in developing countries, and will contribute to the elimination of the digital divide.
2) Complementing the usual technical cooperation projects carried out through face-to-face methods either by dispatching experts or through

training in Japan will result in increased effectiveness of technical cooperation. Also, the efficiency of a variety of activities related to ongoing/past technical cooperation will be improved.

3) Providing instruction by Japan's human resources who are unable to be dispatched as experts to the field and providing training opportunities to numerous actors in developing countries will enable us to fulfill needs that could not be met under the usual framework for technical cooperation projects.
4) By promoting digitalization and systematization of educational materials and teaching methods related to technical cooperation, we can facilitate the consolidation and sharing of know-how and knowledge that is unique to Japan. This will improve the quality of overall technical cooperation.

1-4-3 Scheme Types and Methods for Implementing Distance Technical Cooperation

Distance technical cooperation can be carried out through any of the four schemes listed below, or through a combination of those schemes.

1) Providing advice or instruction to actors in developing countries via a TV conference system (Policy Advice/Discussion Type)
2) Providing training opportunities for actors in developing countries through a distance learning system (Group Training Type)
3) Exchange of opinions and knowledge between those involved in carrying out policy and researchers in Japan and in the developing country over the Internet or via a TV conference system (Forum Type)
4) Providing opportunities for interactive learning over the Internet for actors who are registered in advance (WBT Type)

1-4-4 Structure and Function of JICA-Net

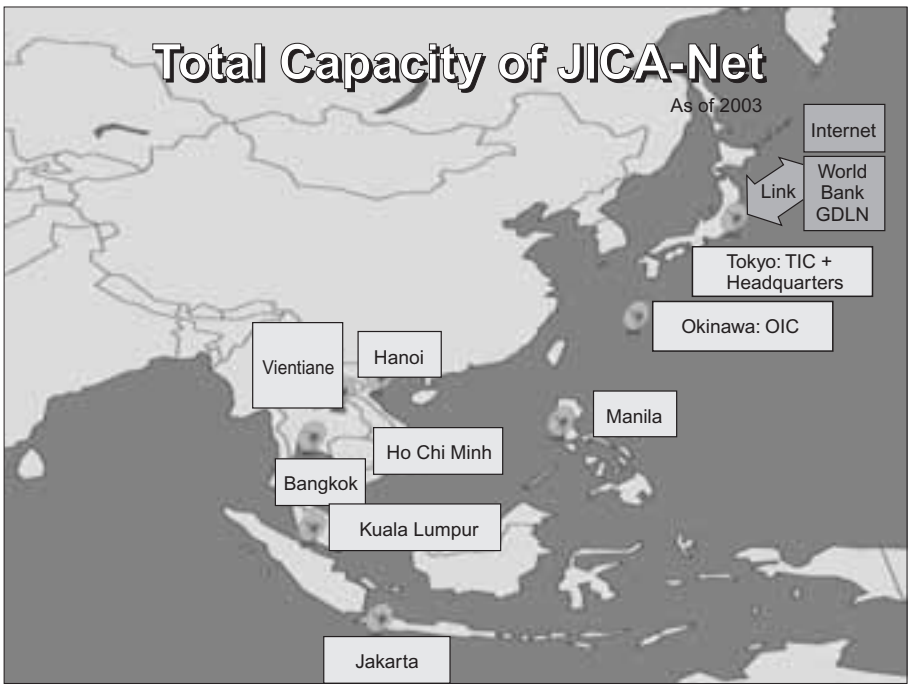
JICA-Net is established in JICA's domestic offices and comprises core centers that have the main function of transmission and satellite centers that are established in JICA's major points of cooperation in developing countries. In FY2001, core centers were established in the Tokyo International Centre and the Okinawa International Centre in Japan, and a TV conference system was set up at JICA Headquarters. Satellite centers have been established overseas in the Indonesia Export Trading Center (IETC), the National Institute of Public Administration (INTAN) in Malaysia, and at the University of the Philippines – Diliman. These core centers and satellite centers form a network of high-capacity transmission lines. In FY 2003 JICA established more satellite centers in Laos, Thailand and Viet Nam. (See Figure A1-2 Total Capacity of JICA-Net.)

The core centers and satellite centers have the function of a facility that

enables live and interactive distance learning and self-instruction for approximately 30 people at one time.

JICA-Net can also be connected to the Center of the World Bank's GDLN (Global Development Learning Network) that is being developed by over 50 countries worldwide, and either network can utilize the other. Through this, distance technical cooperation can be conducted even for countries that do not have established satellite centers by using the local GDLN centers. Moreover, if the recipient country has developed communication infrastructure and a TV conference system in place, it can connect to anywhere else in the world.

Figure A1-2 Total Capacity of JICA-Net



Annex Table: List of Relevant Projects in IT

No	Country	Project Name	Period	Type of Schemes	Mid-term Objective	Characteristics
1. Strengthening Capacity for IT Policy Formulation						
1	Worldwide	International Telecommunication Services	1962-	Acceptance of Trainees	1-1	Training conducted with the goal of improving management techniques targeting personnel involved in management and operations throughout the international communications industry.
2	Worldwide	ICT Executives' Seminar (Info-Communications)	1962-	Acceptance of Trainees	1-2	Training conducted with the goal of deepening the understanding of the importance of telecommunications administration targeting high-ranking officials involved in telecommunications administration or work.
3	Worldwide	Seminar on Telecommunications Management	1993-2000	Acceptance of Trainees	1-1	Training conducted with the goal of improving problem-solving capabilities in management with respect to management methods of the telecommunications administration that will facilitate the transition process from state-owned enterprise through privatization.
4	Indonesia	Telecommunication Policy Advisor	2002-2004	Dispatch of Experts	1-1 1-2	Provides advice on formulating long-term development policies in the field of telecommunications and assistance for telecommunications policy. Specifically, this project plans policy for charges and develops a fair competitive environment for the development of telecommunications infrastructure.
5	Indonesia	Preparation and Improvement of IT Usage Environment	2002-2004	Dispatch of Experts	1-1 1-2	Formulates a basic plan for promoting IT and provides recommendations on specific management rules for the IT industry. Contributes to establishing a framework for managing new telecommunications services, including digital signatures, a certification system, and VoIP.
6	Malaysia	Communications and Multimedia Technology and Industry	2002-2004	Dispatch of Experts	1-1 1-2	Provides advice on formulation of a long-term technological development plan in the fields of communication and multimedia, a long-term plan for fostering industry, and a plan to promote research and development in the fields of communication and multimedia.
7	Malaysia	The Study on Enhancement of Info-Communications Access in Rural Communities in Malaysia	2002-2003	Development Study	1-3 3-1 3-3	Supports the formulation of an action plan of info-communications access in rural communities particularly for the enhancement of Rural Internet Centers (RIC) in the area and provides assistance in the planning and implementation of model projects.
8	Philippines	Telecommunications (Network Planning, Multi-media Communications Information Technology)	2000-2002	Dispatch of Experts	1-1	Provides advice on policy for smooth interconnection between providers and on policy for multimedia communication.
9	Thailand	IT Policy	2000-2001	Dispatch of Experts	1-2 2-1 2-2	Specified the direction of R&D activities and provided advice regarding activities for promoting R&D.
10	Viet Nam	The Study on Telecommunications Development in the Socialist Republic of Viet Nam	1998-1999	Development Study	1-1	Formulated a plan for telecommunications development.
11	Laos	International Telecommunication Service (Administration and Management)	1997-1998	Acceptance of Trainees	1-1	Training conducted with the goal of improving management capabilities in international communication management targeting personnel involved in international communication work.

No	Country	Project Name	Period	Type of Schemes	Mid-term Objective	Characteristics
12	Laos	The Study on the Telecommunications Development in Lao P.D.R.	2001-2002	Development Study	1-1	Formulated a telecommunications development plan.
13	Laos	Advisor on Telecommunication Policy to the Cabinet Office (Communication)	2000-2003	Dispatch of Experts	1-1 2-2	Provides support on IT policy making and implementation, support on developing and carrying out ordinances related to IT, and guidance and recommendations on implementing telecommunications development plans.
14	Laos	General Advisor for Telecommunications Network Development and Management	2002-2004	Dispatch of Experts	1-1	Supports the creation of a scenario for a basic development plan in developing telecommunications, supports diffusion of the concept of public communication services, and supports the establishment of a management framework for state-owned telecommunications enterprise.
15	Mongolia	Master Plan Study for the Development of Rural Telecommunication System in Mongolia	2002-2003	Development Study	1-3 3-1 3-3	Formulates a master plan for the development of rural telecommunications systems and carries out a feasibility study.
16	Central Asia	Telecommunication Business Management	1993-2001	Acceptance of Trainees	1-1	Training conducted with the goal of improving management of the telecommunications industry in Central Asia as it makes the transition from planned economy to market economy. This training introduces know-how and business management information from Japan's telecommunication policy and business management.
17	Africa	Telecommunications Executives' Seminar (African Countries)	1997-1999	Acceptance of Trainees	1-2	Training conducted with the goal of strengthening the importance and deepening the understanding of telecommunications administration targeting high-ranking officials involved in telecommunications administration or work in African countries.
18	Ethiopia	Study on Telecommunications Development Plan in Ethiopia	2001-2002	Development Study	1-1	Formulated a master plan including expansion of the communication network to rural areas with low diffusion rates and carried out a feasibility study on the implementation of priority projects.
2. Development of Human Resources in IT						
19	Worldwide	Information Processing Personnel (Instructor)	1985-	Acceptance of Trainees	2-1	Since 1985 JICA has trained engineers from numerous countries on the development and operation of the information systems actually used in the field.
20	Worldwide		1965-	JOCV, SV	3-1	System engineers and computer skill volunteers have carried out human resource development in many countries at the grass-roots level.
21	Worldwide	Vocational Training Instructors (Information & Computer Engineering)	1993-	Acceptance of Trainees	2-1	Training conducted with the goal of qualitatively improving skills and techniques targeting mid-level engineers involved with vocational training in information and computer engineering.
22	Worldwide	Telecommunication(s) Standardization	1995-	Acceptance of Trainees	2-2	Training conducted with the goal of improving frameworks, administrations, organizations and technology for standardization targeting engineering and administrative officials who are involved in standardization of telecommunications.
23	Worldwide	Telecommunications Policy and Regulations	2000-	Acceptance of Trainees	1-2 2-2	Training conducted for policy makers in the field of telecommunications on the necessity of deregulation, the reform of Japan's telecommunications system, telecommunications business laws, mobile communication systems and trends, information and communication resource management, and management of telecommunications providers.

No	Country	Project Name	Period	Type of Schemes	Mid-term Objective	Characteristics
24	Worldwide	Information Technology for School Teachers (and Staff)	2001-	Acceptance of Trainees	2-1	Training conducted with the goal of contributing to the creation of a network between Japan and other participating countries in the field of education. This course teaches educators at the primary and secondary school level about how computers work and helps them to learn basic ways of using computers.
25	Malaysia	The National Computer Institute	1985-1990	Technical Cooperation Project	2-1	Human resource development at the National Personnel Authority / National Computer Institute (NCI). The focus of the project was on system development using hosts.
26	Malaysia	The Malaysia AI System Development Laboratory	1995-2000	Technical Cooperation Project	2-1	Project involved transfer of artificial intelligence (AI) system development technology and the joint development of diagnostic, design, and program models. Evaluation of diagnostic models, particularly in the field of medicine, were high.
27	Philippines	Philippines Software Development Institute	1995-2000	Technical Cooperation Project	2-1	Carried out with the objective of enabling staff to hold their own training courses on UNIX-based client server systems. Content included IT curriculum design development, SQL Server, Access, computer networks, and multimedia.
28	Singapore	The Japan-Singapore Institute of Software Technology	1980-1985	Technical Cooperation Project	2-1	This is an example of success in transferring and ensuring the sustainability of IT skills through training courses, and the impact of this project has also spread to neighboring countries.
29	Singapore	Technical Cooperation Project on the Japan-Singapore AI Center	1990-1995	Technical Cooperation Project	2-1	Training courses, seminars, development of AI system prototypes, etc.
30	Thailand	The National Computer Software Training Center	1991-1996	Technical Cooperation Project	2-1	Targeted general skills in hosts and PCs in COBOL and C languages.
31	Thailand	The Research Center for Communication and Information Technology (ReCCIT), King Mongkut's Institute of Technology, Ladkrabang (KMITL), The Kingdom of Thailand	1997-2002	Technical Cooperation Project	2-1	Targeted 59 counterpart researchers and the project included mobile communication, satellite communications, wireless communication, signal transmission systems, information science, multimedia and virtual research, communication networks, communication circuit design, mixed signal processing, biomedical signal and image, electromagnetic compatibility, microelectronic devices R&D, control and mechatronics, and electromechanical engineering.
32	Thailand	The Project of Capacity Building on the Development of Information Technology for Education (ITEd)	2002-2005	Technical Cooperation Project	2-1 4-2 5-1	This project is a new type of cooperation through collaboration with JOCVs that is being expanded to five rural locations with the purpose of developing web based training (WBT) materials, improving IT literacy for teachers, and establishing a system for accreditation of IT training.
33	Viet Nam	The Viet Nam Information Technology Training	1997-2002	Technical Cooperation Project	2-1	Conducted 96 courses on establishing operation and management systems at posted places mainly using UNIX-based client server systems. Improved skills of counterparts and introduced new technology through seminars.
34	Viet Nam	The Training Capability Strengthening Project on the Posts and Telecommunications Training Center No. 1, The Socialist Republic of Viet Nam	1999-2004	Technical Cooperation Project	2-1	Project to foster trainers who are knowledgeable in the latest technologies and training management in the field of telecommunications and to transfer curriculum and educational development methods for practical training.
35	China	The Computer Software Technology Training Center	1993-1998	Technical Cooperation Project	2-1	Project to transfer technology including UNIX and AI to counterparts. Servers and workstations were used as the main equipment in open systems.

No	Country	Project Name	Period	Type of Schemes	Mid-term Objective	Characteristics
36	Sri Lanka	The Project for Human Resource Development in Information Technology through Capacity Building of University of Colombo School of Computing	2002-2005	Technical Cooperation Project	2-1	Project including a wide range of content such as strengthening IT-related skills and technologies and training counterparts in multimedia, computer networks, information system management and operation, database management and operation, and developing WBT content developers and IT trainers as well as improving research and development.
37	Argentina	The Informatics Training Center in the Argentine Republic	1991-1996	Technical Cooperation Project	2-1	Trainer's training carried out on C++, Oracle, Word, Lotus and other programs with the goal of enabling counterparts to conduct UNIX-based C/S training courses on their own.
38	Paraguay	The Telecommunications Training Center	1992-1997	Technical Cooperation Project	2-1	Developed engineers by assisting with 11 training courses that enabled the staff of the state-owned telecommunications enterprise to use digital technology.
39	Jordan	The Computer Technology Development and Training Center Project	1990-1994	Technical Cooperation Project	2-1	Targeted general skills in hosts and PCs in COBOL and C languages.
40	Jordan	Information Technology Upgrading Project	1999-2002	Technical Cooperation Project	2-1	A project associated with the technical innovations at the computer training and research center (No. 39 of this chart) with the main goal of switching over from hosts to client servers. Broad content included LAN, UNIX, HTML, JAVA, VB, and C++.
41	Poland	The Polish-Japanese Institute of Information Techniques	1996-2001	Technical Cooperation Project	2-1	A research project that increased the number of students and moved the university hospital. High-level project content had a strong electronics engineering component. Through the project laboratories were developed for system design engineering, information and communication engineering, and intelligent techniques in control.
3. Improvement of Communication Infrastructure						
42	Worldwide		1965-	JOCV, SV	3-1	Volunteers working with telephone lines and exchanges contributed to the development of communication infrastructure at the grass-roots level in many countries.
43	Philippines	The Project for Improvement of Earthquake and Volcano Monitoring System	2001-2003	Grant Aid	3-1 4-2	Develops a network for monitoring natural disasters (earthquakes and volcanoes) through the use of computers and communication.
44	Angola	Project for Rehabilitation of the Telecommunications Network in Luanda, Republic of Angola	1996-1997	Grant Aid	3-1	Improved a telephone network involving two telephone exchanges. Provision of plasticized cables, exchange boards and ducts and manholes.
4. Improvement of Efficiency and Effectiveness of Every Sector through the Use of IT						
45	Worldwide	Remote Sensing Technology	1977-	Acceptance of Trainees	4-2	Training conducted with the goal of learning basic technologies such as digital data processing and analysis and to introduce the latest technology trends targeting researchers who are investigating the use of remote sensing data that is obtained from observation satellites.
46	Worldwide	Government Information System(s)	1990-1997	Acceptance of Trainees	4-1	Training conducted with the goal of human resource development for people using administrative information systems that utilize GIS.
47	Worldwide	Financial Industry Information Systems	1994-	Acceptance of Trainees	4-2	Training conducted with the goal of human resource development for the provision and improvement of infrastructure related to financial information systems for ongoing expansion in developing countries.

No	Country	Project Name	Period	Type of Schemes	Mid-term Objective	Characteristics
48	Worldwide	Agricultural Information System Techniques	1996-	Acceptance of Trainees	4-2	Training and practice on agricultural information processing technology and its usefulness as a network for communication
49	Worldwide	Management of Natural Resources and Agricultural Production by GIS (Geographic Information System)	2000-	Acceptance of Trainees	4-2	Training conducted with the goal of teaching the basic concepts of GIS through practical use targeting researchers, administrators, and agricultural technology teachers who are involved with the management of agricultural production.
50	Worldwide	Seminar on Police Info-Communications	2002-	Acceptance of Trainees	4-2	Training conducted for high-ranking police including practical training on the use of the system being used by the Japanese police, with an aim of helping them to realize the importance of the system and facilitating the exchange of information related to law enforcement in each country.
51	Asia Pacific Region	Application of Information and Communications Technology to Statistical Processes	1980-	Acceptance of Trainees	4-2	Training for mid-level statistical personnel in the governments of countries in the Asia-Pacific Region. Training designed for practical skill acquisition in areas such as electronic data processing and software.
52	Indonesia	Image Processing Laboratory for Oil and Gas Study	1989-1994	Technical Cooperation Project	4-2	Technical transfer of remote sensing technology for survey of resources, including digital image processing and other techniques.
53	Indonesia	The Environmental Management Center in Indonesia	1993-1997	Technical Cooperation Project	4-2	Technical cooperation for environmental monitoring and environment information systems.
54	Indonesia	Study on Improvement of the Customs System in the Republic of Indonesia	1997-1999	Development Study	4-2	Analysis of information system for customs, requirement study, definition of demand conditions, design of system outline, creation of system design manual, test planning, design for introduction, and creation of plan for use.
55	Indonesia	Establishment and Capacity Building of Regional Export Training and Promotion Centers	2002-2006	Technical Cooperation Project	4-2	Improves literacy including use of computers in training and obtaining information using the Internet.
56	Malaysia	Study on the Establishment of the River Basin Information System in Malaysia	1996-1998	Development Study	4-2	Formulated a master plan for the development of an information system for the management of Mekong River, constructed a pilot system for a model river, and conducted a feasibility study on the river region information system.
57	Malaysia	Project on Networked Multimedia Education System	2001-2005	Technical Cooperation Project	4-2	Human resource development for teachers and engineers for distance education and developed multimedia educational materials.
58	Malaysia	The Study on Enhancement of Intellectual Property Administration Capacity through Utilization of Information Technology	2002-2003	Development Study	1-2 4-1	Develops a pilot system to improve the efficiency of intellectual property administration and formulates recommendations on further improved efficiency through the use of information technology.
59	Philippines	Modernization of Industrial Property Administration	1999-2003	Technical Cooperation Project	1-2 4-1	Developes a system for patent administration, developes a framework for organizational management, and transfers patent review methods.
60	Thailand	The Industrial Property Information Center	1995-2000	Technical Cooperation Project	1-2 4-1	Developed patent administration system and maintained developed organizational management framework. Also disclosed information over the Internet. This project was a pioneer project for similar projects that have since been carried out in the Philippines and in Vietnam.

No	Country	Project Name	Period	Type of Schemes	Mid-term Objective	Characteristics
61	Viet Nam	The Project on Modernization of Industrial Property Administration	2000-2004	Technical Cooperation Project	1-2 4-1	To develop a patent administration system and a framework for organizational management, and transfer methods for patent examination.
62	Laos	The Establishment of GIS Base Map Data for Mekong River Basin in Lao People's Democratic Republic	1997-2001	Development Study	4-2	Developed a geographic database that would become the base map for GIS in order to support environmental conservation in the Mekong River Basin in Laos.
63	China	Education System for Chinese Patent Information Retrieval System Development	1986-1990	Technical Cooperation Project	4-1	A project for developing an education system for patent information retrieval including host operation and Chinese character processing.
64	Mongolia	ICT Advisor in Education Section	2001-2003	Dispatch of Experts	4-2	Provides advice on formulating a plan for increasing IT education, introduces the Japanese curriculum for IT, and provides technical support for creation of educational content.
65	Bhutan	Projects to Establish Information Systems	2001-	JOCV, SV	4-1	JOCVs, SVs, and Senior Volunteers are dispatched to the major agencies and ministries of the country such as the Ministry of Finance and the Royal Audit Authority and are carrying out cooperation that includes the creation of databases.
66	Argentina	Population Statistics Project in Argentine Republic	1995-2000	Technical Cooperation Project	4-2	Constructed a population statistics information data system and a statistical processing system and network in model provinces that are indispensable in the planning of improved social welfare and medical services.
67	Argentina	Regional Geologic Mapping with Advanced Satellite Sensors	2001-2005	Technical Cooperation Project	4-2	Provides training on data exchange and the basic concepts of remote sensing by environmental sensing satellites, introduces hyper-spectral remote data analysis, and provides guidance on methods of using satellite data in geologic mapping.
68	Paraguay	Proyecto de Mejoramiento del Mercado Central de Abasto de la Ciudad de Asuncion	1981-1988	Technical Cooperation Project	4-2	Developed an information system between the retail market and the central wholesale market as a part of a project to improve the operation of the latter.
69	Turkey	Geologic Remote Sensing Project	2002-2006	Technical Cooperation Project	4-2	Provides training to familiarize counterparts with new hardware and software, GIS-based integrated spatial analysis, and Support for Technical Training Program for Third Countries.
70	Ghana	Computer System Engineering	2002-2003	Dispatch of Experts	4-2	Following the Project for the Improvement of Maternal and Child Health Care Services, this study provides current training and operation, diffusion, and development of computer system.
71	Madagascar	The Establishment of a Database for Geographic Information Systems of the Capital Area in Madagascar	1997-1999	Development Study	4-2	With the goal of developing basic information required to formulate city plans in order to improve living conditions in the capital, this study created geographical data on the capital city and surroundings and developed a GIS database.
5. Improvement of Efficiency and Effectiveness of Assistance through the Use of IT						
72	Japan, Philippines, Indonesia, Malaysia, and countries with GDLN	JICA-Net	2002-	Technical Cooperation Project-Independent Projects	5-1 5-2 5-3 4-2	This is a mechanism for carrying out distance technical cooperation. It has a both a TV conference system and an e-Learning system that can be used separately or in combination. Also able to connect to the GDLN of the World Bank.
73	Fiji	Information and Communication Technologies (ICTs) Capacity Building at the University of the South Pacific (USP-Net)	2002-2005	Technical Cooperation Project	5-1 5-2 5-3	Development of content used in multimedia technology, development of educators in the field of IT, and support for research and development. Countries in the South Pacific region also benefit from these projects.

Appendix 2 Basic Check List

Below is a basic check list of the most representative indicators used for understanding the conditions and degree of the use of IT in a country.

In order to accurately understand the current conditions of the use of IT, it is necessary to also understand the communication infrastructure map and the speed of its lines, the national budget for IT, the ratio of the IT industry in a country's GDP, the state of creation of a master plan by the government, and the progress already made in that plan. Here, the list of indicators is limited to relatively accessible items.

Items/Indicators		Unit	Calculation method	Remarks
Basic National Information				
1	Population	People	millions	
2	Urban population Ratio of urban population	People %	millions Urban population/Total population	
3	GDP	$		
4	GDP growth rate	%	Growth rate for one year or several years	
5	Number of engineers and researchers	People	Number per million of engineers and researchers involved in R&D	
Communication Infrastructure and Access				Fixed telephone lines are a valuable part of the communication infrastructure in terms for IT. Knowing the conditions of a country in this area is very valuable since they determine the capacity for activity. In addition, if GIS type materials in which maps and data are combined to make it easy to grasp the multi-faceted expansion of communication infrastructure throughout a country, this is invaluable data in terms of providing assistance that takes rural areas into consideration. With the development and popularization of ADSL, the old analog lines are now being reconsidered for broadband (high-speed lines), again emphasizing the importance of such information. Mobile phones are now being used as information terminals that can be connected to the Internet, in industrialized nations particularly in Japan. These will also become the main means of communication in developing countries, and rapid technological innovations are expected to continue in the future.
6	Main telephone lines	telephones	Number of fixed telephone lines per 1000 people	
7	Main telephone lines (capital city zone)	telephones	Number of fixed telephone lines per 1000 people	
8	Facility expenses for main telephone lines	$	Facility expenses for fixed telephone lines	
9	Number of mobile telephones	telephones	Number of mobile telephones per 1000 people	
10	Cost of local telephone call	$	Charge for a local call (3 min.)	
11	Cost of international telephone call	$	Charge for an international call to the U.S. (3 min.)	

Items/Indicators		Unit	Calculation method	Remarks
United Nations Development Programme (UNDP) Indicators				
12	Human Development Index (HDI)			These are methods originally developed by the UNDP in order to express the conditions of human resource development and of technology.
13	Technology Achievement Index(TAI)			
IT Devices, Internet Literacy				
14	Computer ownership	computers	Number of computer owners per 1000 people	These are the items most directly connected with understanding the usage conditions of IT. It is difficult to establish a specific indicator for measuring IT literacy, however the number of people who use the Internet is an effective indicator of the existence of literacy required to access the Internet. Internet connection fees are a measurement of whether it is possible to popularize the Internet in terms of cost, when compared to a country's GDP and other factors.
15	Computers connected to the Internet	%	Ratio of computers connected to LANs or WANs	
16	Internet users	People	Number of people who use the Internet	
17	ISP (Internet Service Provider) Fees	$	Monthly fees for connecting to ISP	
18	Communication fees associated with connecting to the Internet	$	Monthly communication fees for connecting to the Internet	

*For details on the methods used to calculate the Human Development Index (HDI) and the Technology Achievement Index (TAI), see UNDP (2001)

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UNDP (United Nations Development Programme) "Asia-Pacific Development Information Programme"
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Development Objectives Chart on Information and Communication Technology (1)

Development Objectives	Mid-term Objectives	Sub-targets of Mid-term Objectives	Examples of Activities
1 Strengthening Capacity for IT Policy Formulation	**1-1 Establishment of Telecommunications Policy**	**Support for Improvement of Management of State-owned Enterprise**	
①Formulation of national IT strategies	①Number/rate of service subscribers ②Scale of telecommunications industry ③Degree of liberalization	①Decline in number of waiting applicants ②Improved balance in state-owned income and expenditures ③Increase in amount invested in infrastructure	◎Support the formulation of national development plans ○Improvement the management of the state-owned enterprise △Support the formulation of policies for the shift over to privatization
		Regulations on Private Monopolies	
		①Decline in number of waiting applicants ②Improvement in capital structure (percentage of government-owned capital) ③Increase in amount invested in infrastructure ④Increase in amount of foreign input	○Support the establishment of a system for regulations on providers (administering service levels and established charges) ×Support the formulation of policies for foreign input ×Support policies that promote private investment
		Introduction of Market Principle	
		①Number of new market entries ②Increase in the scale of the telecommunications industry ③Decline in the price of communications	×Support the formulation of policies for input of foreign capital ×Support policies that promote private investment ×Support deregulated market entry ○Support the formation of a competitive market (monitoring system on actions by the former monopolistic provider that would block new market entry)
	1-2 Establishment of Policy to Foster IT Industry	**Establishment of Direction and Policy for Fostering IT Industry**	
	①Scale of the IT industry ②Market share of IT-related industries ③Amount of private sector IT investment ④Importance of the IT industry in the national economy	①Existence of laws or government policies ②Existence of exclusive organizations	△Advice on the direction of fostering the IT industry ×Creation of policies on IT-related privatization △Creation of policies on IT-related investment promotion ×Creation of policies on IT-related foreign investment △Support for developing and enforcing ordinances related to information and communication
		Establishment of Systems to Protect Intellectual Property Rights	
		①Existence of laws related to protection of intellectual property rights ②Existence of exclusive organizations	○Support for developing laws related to protection of intellectual property rights ×Support for establishing and operating organizations for protection
		Development of Policy Makers (High Level Human Resources)	○Support and training for development of high level human resources
	1-3 Establishment of Policy to Eliminate Domestic Digital Divides	**Establishment of Policy to Promote Development of Infrastructure in Rural Areas**	○Support the introduction of systems to encourage rural development (Universal Service)
	①Regional differences in Internet use ②Regional differences in fixed and mobile telephone subscription ③IT use by vulnerable groups (the poor, disabled, women)	①Increase user rates in rural areas	
		Improvement in IT Literacy	
		①Existence of policies to improve literacy ②Increase user rates among the poor ③Literacy surveys	△Promote the use of the Internet △Systems to encourage services that provide relief to vulnerable groups
	1-4 User Protection	**Establishment of Laws for User Protection**	×Training for related personnel △Development of security systems ×Development of systems to protect personal information ×Development of systems to protect consumers ×Development of systems to prevent unauthorized access
	①Number of claims and handled claims against related organizations	①Existence of laws or government policies	
		Establishment of Dispute Settlement Organizations	×Establishment and operation of dispute settlement organizations
		①Existence of exclusive organizations	
		User Education	×Support and training for user education
		①User protection environment	
2 Human Resources Development in IT	**2-1 Development of Engineers and Instructors**	**Expansion of Content**	
①Fulfill the demand for national IT objectives	①Supply and demand conditions in each technical field ②Standards for technical level	①Number of Web pages created in the own country ②Number of times content is accessed	◎Transfer Web content creation technology ◎Transfer multimedia content creation technology ○Promote the creation of local content
		Development of IT Engineers	◎Transfer network technology ◎Transfer database technology ◎Transfer Web technology ◎Transfer security technology ◎Creation of content for technical transfer ◎Use of JICA-Net in technical transfer ×Support for creation of local fonts and FEPs ×Support for technology to create low-cost PCs ○Promotion of the use of open and free software ○Vocational training (technical transfer of skills useful for competing in the industry, occupational skills training) ◎Technical transfer of other special information technologies (including AI, CAD/CAM, GIS, GPS)
		①Number of network engineers ②Number of database engineers ③Number of Web engineers ④Number of security engineers	
		Increasing and Improving Educational Institutions	◎Develop facilities for IT-related education ◎Provide IT-related equipment and materials ○Support research and development (R&D) ◎Support degree program courses ◎Develop instructors for IT
		①Number of specialized in IT schools ②Number of IT related instructors	

Examples of Activities:
◎=JICA has considerable experience
○=JICA has certain experience
△=JICA has experience as a component of projects
×=JICA has little experience

Development Objectives Chart on Information and Communication Technology (2)

Development Objectives	Mid-term Objectives	Sub-targets of Mid-term Objectives	Examples of Activities
		Technological Improvement in the Field of Communication Technology ①Number of engineers in communication network maintenance ②Number of engineers in high-speed communication network	○Technical transfer of communication network maintenance ○Technical transfer of high-speed communication networks
	2-2 Development of Policy Makers	**Development of Administrative Human Resources** ①Number of personnel to be trained per administrative organization	◎Human resource development training of administrators at the actual working level
3 Improvement of Communication Infrastructure ①Plan for improvement of communication network	**3-1 Provision of Communication Infrastructure** ①Telephone diffusion rate ②Number of people able to use the Internet	**Provision of Backbone Network** ①Degree of potential communication capacity ②Network reliability	×Introduction of a public communication backbone ◎Increase communication infrastructure ×Support the introduction of third generation mobile phones ◎Rehabilitation of old lines ×Installation of VSAT ○Installation of other specific purpose communication networks
		Provision of Access Network ①Transmission quality ②Rate of diffusion of fiber optics	△Advance the development of fiber optics ×Installation of Internet Exchanges (IX) ×Support introduction of IPv6
		Provision of Infrastructure in Rural Areas ①Resolving the issue of regions with no telephones ②Promotion of regional industry	△Increase in telecommunications infrastructure ×Installation of VSAT ×Expansion of communication region through partnerships with the private sector
	3-2 Fostering Internet Service Providers (ISPs) ①Number of people able to use the Internet	**Expansion of Access Points** ①Number of access points	×Establishment of access points
		High-speed Communication ①Transfer speed ②Areas available with Broadband ③Distance available with Broadband	×Technology transfer of xDSL, FTTH ×Promotion of change to xDSL, FTTH
	3-3 Provision of Access Points	**Provision of Public Access Points** ①Number of public access points ②Number of public access point users ③Increase in hours of use at public access points	△Installation of public telephones ×Village phone △Establishment of MCTs (Multipurpose Community Telecenters) △Establishment of Internet kiosks ×Development of IT hardware at public facilities in communities (government agencies and ministries, local governments, educational institutions)
4 Improvement of Efficiency and Effectiveness of Every Sector through the Use of IT	**4-1 Promotion of e-Government** ①Plans for using IT in governments	**Electronic Filing of Administrative Procedures** ①Number of application and notification procedures available online ②Introduction of electronic biddingin infrastructure	×Support for electronic filing of application and notification procedures ×Support for introducing an electronic bidding system
		Streamlining Government's Internal Processes ①Degree of diffusion of networks between government agencies ②Systemization of administrative work	◎Support for development of administrative systems (e.g. intellectual property rights) ◎Provision of OA equipment ○Support for creating land and regional information using GIS ×Technological support for e-voting
		Promotion of Information Disclosure ①Number of disclosed information items ②Of the above, the number of digitized items	×Proactive publication of project information ×Research into examples of countries that are advanced in information disclosure
		Citizen Participation in Policy Making	×Citizen participation in development studies ×Proactive publication of the activities of policy advisors
	4-2 Promotion of the Use of IT in Every Sector (such as health care, medicine, education)	**Promotion of e-Learning** ①Rate of diffusion of e-Learning	◎Use of JICA-Net ○Provision of equipment and materials for distance education
		Support for Content Creation	○Support for using IT in educational materials
		Promotion of the Use of IT as a Tool for Statistics and Analysis	○Support for developing systems for statistics and analysis ×Support for improving the IT literacy of users ◎Use of JICA-Net
		Other Specific Use of IT	×Diffusing networks for food sanitation and safety ◎Remote sensing (GPS, GIS) ◎Disaster warning systems Distance medicine Environmental monitoring ○Other

Examples of Activities:
◎＝JICA has considerable experience
○＝JICA has certain experience
△＝JICA has experience as a component of projects
×＝JICA has little experience

Development Objectives Chart on Information and Communication Technology (3)

Development Objectives	Mid-term Objectives	Sub-targets of Mid-term Objectives	Examples of Activities
5 Improvement of Efficiency and Effectiveness of Development Assistance through the Use of IT	**5-1 Dissemination and Transfer of Existing Knowledge**	**Digitization of Skills and Knowledge** ①Increase and improve digitized educational materials	○Packaging of educational materials through JICA-Net ○Systemization of sector-specific knowledge ○Creation of digital educational materials for each project
		Dissemination and Transfer of Knowledge through Distance Training ①Number of distance lectures and seminars ②Number of WBT courses held	○Popularization and transfer using remote methods (including JICA-Net) ◎Courses using TV conferencing ×Creation of a library on the Internet ○Web Based Training with learning management
	5-2 Sharing and Creation of Knowledge and Experience	**Sharing of Knowledge and Experience**	×Sharing of existing content with other donors and developing countries ○Joint development of content with other donors and developing countries
		Joint Creation of New Knowledge	×Convening opportunities for joint creation between donors (such as workshops) through distance technology ×Joint conferences with other donors ×provision of opportunities for sharing experiences between developing countries ×Joint research between school networks ×Holding distance global dialogue
	5-3 Use of IT in Project Implementation	**Systematization of Knowledge and Know-how**	○Systematization of sector-specific knowledge
		Distance Discussions and Consultations	◎Consensus-building through TV conferences

Examples of Activities:
◎=JICA has considerable experience
○=JICA has certain experience
△=JICA has experience as a component of projects
×=JICA has little experience