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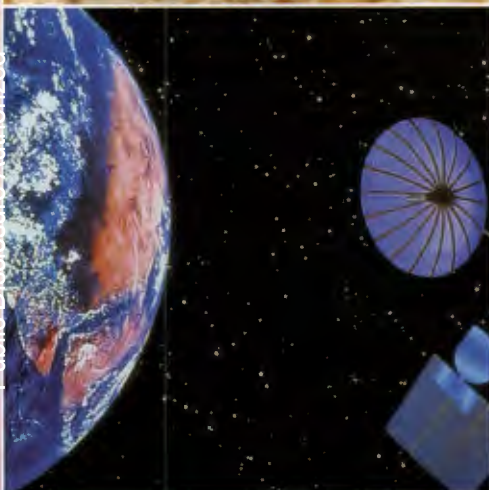
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Information and Communication Technologies



A World Bank Group Strategy
April 2002

Information and Communication Technologies

A WORLD BANK GROUP STRATEGY

THE WORLD BANK GROUP
Washington, D.C.



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EXECUTIVE SUMMARY

Knowledge is a fundamental driver of increased productivity and global competition. It is seminal to invention, innovation, and wealth creation. Information and communication technologies provide a foundation for building up and applying knowledge in the private and public sectors. Countries with pervasive information infrastructures that use innovative information technology applications, possess advantages for sustained economic growth and social development.

In this rapidly evolving environment, developing countries face opportunity costs if they delay greater access to and use of information infrastructure and information technology, which together make up information and communication technologies (see Box 1 for more detailed definitions). Indeed information and communication technologies:

- are a key input for economic development and growth;
- offer opportunities for global integration while retaining the identity of traditional societies;
- can increase the economic and social well-being of poor people, and empower individuals and communities; and
- enhance the effectiveness, efficiency, and transparency of the public sector (including the delivery of social services).

Because of these factors, information and communication technologies are central to meeting both World Bank Strategic Directions Framework priorities: building the climate for investment and sustainable growth; and empowering and investing in poor people.¹ Implementing a strategy to support information and communication technologies development in our client countries is high on the agenda of the World Bank Group.

Growth in the use of information infrastructure in developing countries during the 1990s has been impressive but inequitable among and within countries. While the gap in fixed and mobile telecommunication has narrowed, a “digital divide” has emerged in more advanced information infrastructure and is still growing. The recent collapse of telecommunication and technology equity markets, a shrinking pool of global investment capital for innovation, and a number of failed privatization efforts have induced lower tolerances for risk, and reduced private sector-led infrastructure investments and lending for emerging markets.

Role of the World Bank Group

The World Bank Group is developing a framework for supporting the knowledge economy of its client countries based around a dynamic network infrastructure, an economic and institutional framework conducive to the creation and flow of knowledge, an educated and skilled population, and a network of knowledge communities. The approach to information and communication technologies proposed in this Sector Strategy Paper fits within this broader Knowledge Economy Strategy and focuses on information infrastructure development.

In developing its information infrastructure activities, the World Bank Group will build on a proven record of quality projects. The recent Operations Evaluations Department/ Operations Evaluation Group review of the World Bank’s telecommunication activities identified it as one of the best performing in the Bank’s portfolio. International Finance Corporation investments in information infrastructure have attracted \$8.70 of private financing for each dollar of International Finance Corporation financing. However, an agenda of telecommunication reform and private investment support, while highly successful, is no longer enough to help client countries thrive in this new technological and economic environment. The donor community supports a larger World Bank Group role in information infrastructure-related development activities. The G-8 Okinawa charter on the global information society concluded that the World Bank Group has an important role to play in this area.

More broadly, it is the *exploitation* of the new tools of the knowledge economy across all economic sectors that will lead to opportunity, security, and empowerment for poor people. The span of applications reaches beyond sectors and issues covered in the Knowledge Economy Strategy, to the Comprehensive Development Framework covering structural, human, physical, and sectoral development. Information and communication technologies applications have a role in improving competent government, in facilitating better development of health care, in expanding access to infrastructure, and in promoting rural development, for example.

Across sectors, regions and programs, the World Bank Group is confronting the challenges and working to seize the opportunities presented by the tools

of the knowledge economy. In particular, the role of information and communication technologies applications in meeting sectoral and country assistance development goals is being examined. The Poverty Reduction and Economic Management and the Human Development Network, for example, already have a sizeable portfolio of projects with information technology components. The Legal Department is assisting countries to respond to the regulatory challenges of e-commerce. The World Bank Institute and Development Economics are providing research and knowledge programs, and a range of special initiatives such as the Development Gateway are exploiting the new technology of the Internet.

Scope of the Sector Strategy Paper

The information and communication technologies sector is dynamic, changing at a rapid pace. Combined with this evolution is the ubiquity of information technology across the sectors. And because information technology is a tool, defining its role in sectoral projects can be accomplished only after priorities for that sector have been agreed, and means to achieve them have been set. Such a process is clearly the responsibility of

each sector and country department. It would be a Sisyphean endeavor to attempt to construct a single detailed strategy for the World Bank Group's use and support of information and communication technologies applications across sectors and regions.

In this regard, this paper should be seen primarily as a business strategy for the World Bank Group's role in the development of information infrastructure, with some discussion (in a stand-alone Chapter Five) of broader information and communication technologies issues facing the World Bank Group. The paper maps out a plan for expanding the institutional development capacity of the Global Information and Communication Technologies department and the regions in order to successfully implement the strategy, and discusses some issues connected with information technology quality assurance and improving the World Bank Group's capacity to ensure quality. It is hoped that this Sector Strategy Paper will be a trigger for further discussion of these issues, as well as ongoing strategic thinking on how to use information and communication technologies as an enabling platform to improve the effective delivery of World Bank Group services. Special initiatives related to information and

	Current approach	New approach
Mission	Expand and modernize telecommunications.	Extend access to a wider range of ICTs and related applications.
Policy and technical assistance	Telecommunications reform: competition, privatization, and regulation.	Facilitate convergence. Develop e-commerce/e-governance. Utilize posts and media. Expand access beyond the market. Build institutional capacity.
Infrastructure	Fixed and mobile voice and data networks.	Hard and soft information infrastructure, including Internet and broadband networks. Regional solutions.
Applications	Strategic information systems. Project components.	Sector-based applications. E-government/e-procurement. E-commerce. City-to-City knowledge networks.
Instruments/Vehicles	Traditional application of WB and IFC instruments.	Combining IFC/WB investments. New innovative instruments (venture capital, capital market facilities, local currency financing). Universal access funds. Public/private partnerships and co-financing. Small technical assistance grants. Special purpose initiatives (IT incubators, e-readiness).

communication technologies are discussed in Annex 5, but will be considered in a broader review of the Bank's knowledge work being undertaken at the Managing Director level.

Our vision

Our vision is for the World Bank Group to be a catalyst in improving access to information and communication technologies and promoting their use for stimulating economic growth, increasing equality, and reducing poverty. Realizing this vision involves broadening the Bank's established agenda, involving a shift in the approach to the sector.

A new strategic agenda

The new agenda comprises action along four strategic directions for World Bank Group lending, and knowledge products related to information and communication technologies over the next three years. These directions clearly relate to poverty alleviation (as discussed in the Poverty Reduction Strategy Paper Sourcebook information and communication technologies chapter), as well as to private-sector led growth, which has been clearly demonstrated to be an important element of sustainable poverty reduction.²

Broadening and deepening sector and institutional reform

The scope of policy-based and technical assistance operations will be broadened from telecommunication to cover the entire information infrastructure sector. First, to deal with increasing convergence among technologies, lines of business and enterprises, all elements of the physical infrastructure—such as cable, wireless and satellite networks, optical fiber rings, Internet Service Providers, data storage centers, and broadcasting facilities—will be addressed within an integrated policy framework. Second, legislative and regulatory changes will be pursued as required to facilitate the commercial and social exploitation of the Internet through e-commerce and e-government applications. Third, policy reforms will include traditionally overlooked sectors such as postal and distribution logistics (media and content), which are particularly relevant to the poor due to their low cost and wide reach. Fourth, support for regulatory development and capacity building will be extended beyond initial reforms to ensure sustainability and effective development of competitive markets. (Annex 2 suggests a number of generic country issues to be addressed in information infrastructure development policy).

Increasing access to information infrastructure

The World Bank Group will promote private sector

leadership in extending the reach of information and communication technologies through development of information infrastructure. To this end, the World Bank Group will increasingly focus on mobilizing and leveraging private sector investments and finance. It will exploit the potential for complementarities among existing World Bank, International Finance Corporation, and Multilateral Investment Guarantee Agency instruments, as well as apply them in innovative ways such as in incubators, joint privatization operations, and universal access packages. The World Bank Group will also support the development of soft infrastructure such as software development, enabling technologies, encryption software, and delivery and payment systems, which are the foundation for transactions on the Internet. To ensure that the benefits of sector reform are widely distributed to rural and marginal urban areas, the World Bank Group will provide technical and investment assistance to extend access beyond what commercial providers are prepared to do on their own. It will encourage a variety of mechanisms to do this, such as universal access objectives and targets, specialized funds to provide onetime capital subsidies to promote access in liberalized markets, and local participation in nonprofit communication and information facilities. Where possible, universal access initiatives will exploit synergies with other rural infrastructure projects and with special initiatives such as World Links for Development and the Global Distance Learning Network.

Supporting information and communication technologies human capacity

The World Bank Group will support the development of a human capital base for exploiting information and communication technologies through better-educated population. The benefits of access to information infrastructure can only be realized when potential users possess the skills to apply these tools for economic and social purposes. The most important use of information and communication technologies in education is as a pedagogical tool, when properly integrated into a broader educational program. However, there is also a need for information and communication technologies to be used to develop sector-specific skills and capacity. The shortage of information and communication technologies skills slows the process of development and exacerbates the lag that client countries are experiencing in joining the global knowledge economy. World Bank Group support for information and communication technologies human resources will be pursued at three levels. First, there will be support for the rollout of information and communication technologies (where appropriate) at the school, college, and

adult education level. Second, private sector partnerships will be formed for technical skills training of the next generation of information and communication technologies workers, such as network technicians, computer programmers, web developers, and database managers. Third, advice and skills training will be provided for entrepreneurs and government officials seeking to develop knowledge economy applications and industries.

Supporting information and communication technologies applications

World Bank Group investments in information and communication technologies will support a wide range of business models and information technologies in operational projects. International Finance Corporation investments will focus on the use of information and communication technologies as a platform in applications that would enhance public administration and private sector development, as well as on those with a significant social sector development impact. Additionally, information and communication technologies will continue to be included as a component of World Bank projects in most other sectors, especially in education, health, finance, small business development, and public sector management. It is important to ensure that information infrastructure and information and communication technologies applications are integrated into Sector Strategy Papers, Poverty Reduction Strategy Papers, and Country Assistance Strategy processes. In some cases, this will be as part of a knowledge economy strategy, in other cases, the role of information and communication technologies in helping to meet Country Assistance Strategy goals should be explored. The Global Information and Communication Technologies department will support this process through support for economic and sector work programs. This will ensure that the development impact of the new technologies is fully harnessed.

Selectivity and evaluation

In order to maximize our development impact, the World Bank Group will concentrate its information infrastructure activities where discussion with country and regional teams suggest that information infrastructure is acting as a bottleneck to development. Two sets of countries are suggested where this might be the case: those at maximum risk of falling further behind and those with the greatest potential to benefit from the new information infrastructure technologies. Selectivity will also be exercised in terms of instruments—in International Finance Corporation “frontier” markets (the least developed countries and

the least developed regions of middle income countries), for example, the focus will be on connectivity while exploring the potential use of information technology for economic and social development. In wealthier regions, support for policy reform, and investments covering convergence technologies and information technology services and applications will receive greater attention.

The World Bank Group will also take part in the generation of global public goods—through research and dissemination of knowledge about information and communication technologies, mobilization of local and international information technology industries to focus more directly on poverty alleviation based on information technology, and support for developing country participation in international institutions related to information and communication technologies. In an area that is changing so rapidly and where the World Bank Group is rolling out a range of new products and instruments, monitoring and evaluation must be central. The World Bank Group will track a range of indicators of sector development and project success, and ensure the rapid integration of lessons learned into new project design.

Implementation strategy

Successful implementation of the proposed information and communication technologies strategy requires a division of responsibilities across the World Bank Group, and between the Global Information and Communication Technologies department and the rest of the World Bank Group. Unlike most sectors, information and communication technologies have wide-ranging implications for all areas of focus in the World Bank Group. Their pervasive nature makes a coordinated approach throughout the World Bank Group all the more important. Successful implementation also calls for organizational innovations needed to ensure that the Global Information and Communication Technologies department is well equipped to deliver on its mandate. And some issues affecting information and communication technologies human resource development and obtaining maximum value from information and communication technologies applications in other sectors need to be addressed.

Division of responsibilities

The Global Information and Communication Technologies department will assume primary responsibility for the first two interrelated strategic directions: helping to create the enabling environment and improving access to information infrastructure. The Global Information and Communication Technologies department together with the regions and sectors will

work to integrate broader information and communication technologies policy and institutional reform work within country programs, as well as with activities in areas such as fiscal, trade, competitiveness, and financial sector policies. In some cases, the Global Information and Communication Technologies department will also build linkages or partnerships with other Bank departments that possess specialized skills to more effectively deliver on these strategic directions. For example, the Global Information and Communication Technologies department will seek the assistance of the Legal Operations department on the legal aspects of sector reform. To track World Bank Group performance as it relates to development effectiveness, a set of internal and external indicators will be monitored and evaluated jointly by the Global Information and Communication Technologies department and the regions.

The Global Information and Communication Technologies department will play a supporting role in planning and executing the third and fourth strategic directions where necessary. Efforts to develop a human capital base to exploit information and communication technologies through training and education programs will remain the responsibility of the World Bank Group education departments. The respective sector units will develop information and communication technologies policies and applications in other sectors across the World Bank Group. While the Global Information and Communication Technologies department will provide support for such development, when necessary, the primary responsibility for using information and communication technologies to improve the development impact of sector-based programs lies with the sector units across the Bank and International Finance Corporation. There is already considerable enthusiasm for, and investment in, information and communication technologies applications across the International Finance Corporation and the World Bank, and a few pockets of excellence are emerging, including ongoing application developments in Poverty Reduction and Economic Management, Human Development, and Private Sector Development networks. However, more sector units need to develop a greater capacity to incorporate information and communication technologies into project design.

Tools and organizational innovations for the World Bank Group

The demand by the client countries to harness information and communication technologies for development is accelerating and requires a Bankwide response. The recently created Global Information and Com-

munication Technologies department is now in a strong position to support other parts of the World Bank Group in providing the range of services needed by our client countries. However, to competently meet country demand requires attention to a number of organizational innovations:

- *Management development:* The Global Information and Communication Technologies department will improve its implementation approaches to respond to development opportunities creatively, quickly, and efficiently. The Global Information and Communication Technologies department will work closely with country and sector management units to integrate information infrastructure and information and communication technologies more broadly into Country Assistance Strategies, economic and sector work, and World Bank Group lending programs. The Global Information and Communication Technologies department regional coordinators and economists will support analytical work and country dialogue to assist country teams in developing information infrastructure, and broader information and communication technologies strategies and projects.
- *Products and services innovation:* The urgency of sector reform, rapid development of new technologies, and tightening of capital markets demand an expanded role for World Bank Group product lines, a more proactive approach, and a rapid project roll-out capacity. Also, in order to respond quickly to client requests for technical assistance that have been supported by World Bank country teams to resolve investment bottlenecks, a limited technical support capability will be developed and launched through such existing vehicles as the *infoDev* program. Finally, World Bank Group synergies to support a broader and deeper strategic approach will be enhanced by deploying new tools like e-readiness assessments, information and communication technologies country strategies, and e-government toolkits.
- *Knowledge and skills development:* The World Bank Group will enhance its skills and knowledge through an expanded program of research on issues of information and communication technologies and economic development, and through systematic learning from its own operational experiences in the field. The Global Information and Communication Technologies department will also adjust the mix of staff skills to reflect the range of its activities from postal and distribution logistics and media to e-commerce, e-government, and business development. The Global Information and Communication Technologies department will give

a high priority in its work program to knowledge sharing with the World Bank Group's regions, and to facilitating stronger relationships with centers of information and communication technologies expertise outside the World Bank Group. The World Bank Group's information and communication technologies sector strategy will also include increased staff training for both the Global Information and Communication Technologies department and other World Bank Group staff in such areas as e-commerce, e-government, and e-learning. It will also introduce new techniques such as staff exchanges and mentor programs.

- *External partnerships:* In line with Comprehensive Development Framework principles, external partnerships will play an important role in the implementation of the new strategy. The World Bank Group is already cooperating on information and communication technologies issues with United Nations organizations such as the United Nations Development Program, the International Telecommunication Union, the Universal Postal Union, the United Nations Commission on International Trade Law, and the World Trade Organization. Recently, the interaction between the World Bank Group and the Inter-American Development Bank in this area has increased. The World Bank Group will work on coordinating strategies with bilateral agencies in client country information and communication technologies sectors. Multilateral and bilateral relationships will be strengthened. At the same time, the World Bank Group will work with nongovernmental organizations to move toward community-driven development in the sector with increasing focus on rural areas. The Development Gateway Foundation and its work in creating knowledge resources and supporting initiatives to diminish the digital divide will be a priority for new partnerships. *infoDev*, for example, is already supporting the development of country gateways through grants.

Information and communication technologies applications

It has been widely documented (by various Internal Audit reports) that the World Bank Group's current process for designing and implementing information technology components of projects needs strengthening. Despite these components accounting for a significant percentage of costs in a range of projects, the skills base to judge their realism, efficacy, and institutional sustainability is rare among task teams and managers. Skills gaps are particularly serious in two areas: new applications in government and the private

sector (e-economy); and also in combined sector expertise with information technology experience. This presents potentially serious risks in terms of the World Bank Group's reputation and project sustainability.

A team of representatives from Poverty Reduction and Economic Management, Operational Policy and Country Services, Information Solutions Group, and the Global Information and Communication Technologies department recently concluded that the long term solution for this skills gap would be to hire sector experts with considerable information technology experience, as well as an active program of training and sensitization among country directors, management, task managers, task team leaders, and procurement specialists in the integration of information technology in a process of institutional change management. This has significant implications for budgets and strategic staffing throughout the World Bank Group.

In the short term, as an interim solution, three programs will be implemented:

- Framed in the context of improving risk management at the operational level, the significant complexity of information technology components will be made clear to all staff involved in project preparation, along with suggestions for sources of assistance, guidelines on thresholds for seeking such assistance, and a recommendation to seek assistance as early in the project cycle as is feasible. Because the information and communication technologies revolution may have a far-reaching impact on emerging economies, and thereby on the way many of our client governments do business, the broader strategic implications need to be considered during the Poverty Reduction Strategy Paper and Country Assistance Strategy discussions.
- A Task Manager's Toolkit on Information Technology Components will be developed, covering issues such as procurement, risk identification and management, recurring problems in information technology projects, and key concerns of information technology project management. The toolkit will provide recommendations to teams on when to seek assistance during project preparation and appraisal, including on the advice to provide borrowers contemplating substantial information technology components, and sources for that assistance. The toolkit should be widely disseminated within the World Bank Group and to the clients, and made available on-line.
- A Quality Enhancement Team will be formed to provide advice on information technology components when required, as judged by the managers responsible for an operation as part of the World

Bank Group's efforts to manage risks during project preparation and supervision. It will consist of staff from Information Solutions Group, Operational Policy and Country Services, Poverty Reduction and Economic Management, Human Development, and Global Information and Communication Technologies department with significant experience in the use of information technology in World Bank projects. The team will provide early reviews—Project Appraisal Document stage—of information technology components in projects. Reviews will be strongly advised for information technology components whose complexity, scope, or size are such that their failure would compromise the overall development objectives of the operations.

Operational policy documents

A Good Practice Statement on World Bank Group information infrastructure operations will be updated from time to time. The recommendations in Operational Policy 4.50, the World Bank's telecommunication sector policy statement of 1995, remain valid. However, the Operational Policy is in fact a collection of recommended good practices, instead of mandatory policy measures. The Sector Strategy Paper proposes therefore that Operational Policy 4.50 be retired and replaced by a Good Practice statement to be published by the Global Information and Communication Technologies department. Annex 1 lays out proposed language for this statement, which adapts Operational Policy 4.50 to the broader agenda for information infrastructure laid out in this Sector Strategy Paper. The most significant changes are:

- The scope is expanded from telecommunication to information infrastructure operations, and from the World Bank to the World Bank Group.
- The role of World Bank Group funding is explicitly expanded to include support for private provision of universal access to voice communication and the Internet, investment in the postal and broadcast sectors, support for the broader policy, regulatory and educational environment for information and communication technologies, and the use of

information and communication technologies in public services.

Conclusion

The digital divide concerns far more than access to computers and networks. It includes training, education, and a range of legal, economic and social institutions. A concerted effort will be needed from within the World Bank Group to assist countries in overcoming the digital divide. And it should be clear that even with this effort, the strategy presented here alone cannot come close to overcoming the digital divide.

At the same time, the strategy laid out in this paper is highly scalable. The tools outlined could be used to dramatically increase access to and use of information and communication technologies in the effort to reduce poverty. The World Bank Group is in a good position to play a major role in an ambitious program with governments, the private sector, nongovernmental organizations, and donors worldwide that would aim at universal access to basic information infrastructure. Such a program would have significant social and economic benefits worldwide, benefits already repeatedly seen whenever such access has been provided in a region previously lacking it. It would require coordinated effort bringing together many actors including partnerships with other international organizations, nongovernmental organizations, and the private sector. For the World Bank Group it means taking an innovative approach to our products and services and refocusing some special initiatives relating to information and communication technologies. Scaling up the proposed strategy would also require effectively bringing information and communication technologies to the forefront of our corporate development agenda and country assistance strategies, where appropriate.

NOTES

1. *Strategic Framework Paper* (OM2001-0007), January 24, 2001.
2. See <http://www.worldbank.org/poverty/strategies/chapters/ict/ict0409.pdf>

ABBREVIATIONS

ANM	Auxiliary Nurse Midwife	IT	Information Technology
APL	Adaptable Program Loan	ITU	International Telecommunication Union
ASP	Application Service Provider	LAC	Latin America and Caribbean
ATM	Asynchronous Transfer Mode	LIL	Learning and Innovation Loan
AVU	Africa Virtual University	LEGOP	Legal Operations Department
B2B	Business to Business	LSMS	Living Standard Measurement Survey
B2C	Business to Consumer	MCT	Multipurpose Community Telecenter
BP	Bank Procedures	MD	Managing Director
CARD	Computer-aided Administration of Registration Department	MENA	Middle East and North Africa
CAS	Country Assistance Strategy	MIGA	Multilateral Investment Guarantee Agency
CDF	Comprehensive Development Framework	MIS	Management Information System
CETESB	São Paulo State Environmental Agency (Brazil)	MOIT	Ministry of Industry and Trade (Indonesia)
CITPO	Policy Division of the Global Information and Communication Technologies Department	MONE	Ministry of National Education (Turkey)
DEC	Development Economics	MSB	Micro and Small Businesses
DECRG	Development Economics Research Group	M&E	Monitoring and Evaluation
DSL	Development Support Loan	NGO	Non-governmental Organization
ECA	Europe and Central Asia	NII	National Information Infrastructure
ECN	Electronic Communication Network	NPV	Net Present Value
ECOWAS	Economic Community of West African States	OCSPR	Procurement Policy and Services Group
ESSD	Environmentally and Socially Sustainable Development	OECD	Organization for Economic Co-Operation and Development
ESW	Economic and Sector Work	OECS	Organization of Eastern Caribbean States
FAO	Food and Agriculture Organization	OED	Operations Evaluations Department
FPSI	Finance, Private Sector and Infrastructure	OEG	Operations Evaluation Group
G-8	Group of 8	OP	Operational Policy
GDLN	Global Development Learning Network	OPC	Operations Policy Committee
GDN	Global Development Network	OPCS	Operational Policy and Country Services
GDP	Gross Domestic Product	PAD	Project Appraisal Document
GICT	Global Information and Communication Technologies Department	PAS	Privatization Advisory Services
GIS	Geographic Information System	PCD	Project Concept Document
GKP	Global Knowledge Partnership	PDA	Personal Digital Assistant
GPG	Global Products Group	PPF	Project Preparation Facility
GSM	Global System for Mobile Communications	PPIAF	Public-Private Infrastructure Advisory Facility
HD	Human Development	PREM	Poverty Reduction and Economic Management
IAD	Internal Audit Department	PRSC	Poverty Reduction Strategy Credit
IBRD	International Bank of Reconstruction and Development	PRSP	Poverty Reduction Strategy Paper
ICANN	Internet Corporation for Assigned Names and Numbers	PSAL	Programmatic Structural Adjustment Loan
ICSC	Integrated Citizen Services Centers	PSD	Private Sector Development
ICT	Information and Communication Technologies	SAC	<i>Serviço de Atendimento ao Cidadão</i> – Shopping Mall for Public Services
IDA	International Development Association	SAL	Structural Adjustment Loan
IFC	International Finance Corporation	SAR	South Asia Region
II	Information Infrastructure	SBEM	SoftBank Emerging Markets
<i>InfoDev</i>	Information for Development Program	SEAF	Small Enterprise Assistance Funds
ILC	Internet Learning Center	SECAL	Sector Adjustment Loan
ISDN	Integrated Services Digital Network	SIL	Specific Investment Loans
ISG	Information Solutions Group	SME	Small and Medium Enterprise
ISP	Internet Service Provider	SSP	Sector Strategy Paper
		TA	Technical Assistance
		TAL	Technical Assistance Loan
		TATF	Technical Assistance Trust Fund
		TATP	Technical Assistance and Training Program

TWINS	Twin Cities Network Services
UNCITRAL	United Nations Commission on International Trade Law
UNDP	United Nations Development Program
VPU	Vice Presidency Unit
VSAT	Very Small Aperture Terminal
WB	World Bank (IDA & IBRD)
WBG	World Bank Group
WBI	World Bank Institute
WHO	World Health Organization
WorLD	World Links for Development
WTO	World Trade Organization

Introduction: Knowledge, Information and Communication Technologies, and the Scope of the Sector Strategy Paper

Knowledge has always been central to development. It is necessary for markets and governments to function, for the process of innovation, and for the application of new ideas. The green revolution that has more than doubled yields of staple crops in Asia and South America over the last 50 years, is an example of the development and application of knowledge through a range of local, national, and international institutions making a dramatic impact on the incomes of the poor. Between 1973 and 1994, the average real income of small farmers in southern India increased by 90 percent, and that of the landless by 125 percent, largely because of the introduction of labor-intensive, high-yielding crop varieties. The successful use of knowledge lies behind much of the growth of the East Asian “miracle” countries over the past half century. Conversely, weaknesses in the application of knowledge are a major factor behind stagnation in income growth in Africa. The accumulation of physical capital—machinery, roads, buildings—explains less than 30 percent of the variations in growth rates around the world over the past 40 years. Much of the rest is accounted for by differences in the growth of educational opportunities, and in the diffusion and application of knowledge. Forty years ago, Ghana and the Republic of Korea had virtually the same income per capita. Today, Korea is approximately six times richer, and more than half of that gap can be attributed to Korea’s greater success in acquiring and using knowledge.

Beyond income, knowledge can add greatly to the quality of life of the economically disadvantaged. While per capita income remains a strong predictor of health statistics, advances in biomedical and epidemiological knowledge have contributed to improved health at every economic level. For example, infant mortality in middle-income countries in 1999 was 31 per thousand live births, compared with 55 per thousand live births 20 years before. The improvements are due to a number of factors, including development and widespread use of new medical technologies such

antibacterial drugs, vaccines and contraceptives; rapid increases in educational attainment (especially among girls and women) that are highly correlated with improvements in child health; and more rapid dissemination of medical knowledge and the spread of health services; all of which have in turn benefited from information technology (IT).¹

The recent advances in information and communication technologies (ICT) have strengthened further the link between knowledge and broad-based development. The “knowledge revolution” provides an

opportunity to foster greater competitiveness, new economic growth and job creation, better access to basic services, improved health and education outcomes, and greater empowerment of local communities. Some remote villages in developing countries are already beginning to use the Internet to sell commodities directly to the global market, to improve educational opportunities, and to increase their participation in decision making.

At the same time, the majority of people in the developing world have no access to basic information and communications networks—let alone the new technology of the Internet. In fact, the gap is worsening, and the digital divide is a growing threat to the development prospects of the poorer countries of the world. Chapter One of this Sector Strategy Paper (SSP) discusses both the opportunities and challenges to broad-based development presented by a range of ICT including the Internet.

An agenda to foster the successful application of knowledge is central to any broad-based development program. Such an agenda would focus not on individual applications (such as an Internet-enabled training program for midwives and doctors, or an e-commerce application for a software company), but on the environment that allows for more rapid acquisition, application, and communication of knowledge in general. Recognizing the importance of knowledge as an underpinning for countries to become competitive in the new economy, the World Bank Group is developing a knowledge economy strategy based on:

- A competitive and dynamic information infrastructure (II) to facilitate effective communication, dissemination, and processing of information.
- The regulatory and institutional framework to provide incentives for the efficient use of existing knowledge, the creation of knowledge, and the flourishing of entrepreneurship. Such a framework would include rules on trade, foreign investment, technology licensing, support for local research, company law, and support for small enterprise and venture capital.
- An educated and skilled population. This highlights the need for continued expansion in educational opportunities for all in developing countries, especially those who have been previously disadvantaged at all levels—girls, the poorest, adults who were denied educational opportunities when young, and the disabled. The speed of advance in ICT also emphasizes the importance of technical training to provide a workforce with the requisite skills.
- A network of knowledge communities to tap into the global stock of knowledge, create new knowledge, and adapt it to local needs.

This SSP covers elements throughout the Knowledge Economy Strategy, but its primary focus is on II. The policy and investment environment for II rollout is the key responsibility of this paper's sponsoring department. However, II involves more than the wires, waves, and postal networks carrying information. It involves software, institutions, and people; Internet hosting services, design applications, and service provision; regulatory institutions and e-economy legislation; and the human resources necessary to ensure that networks, institutions, and software infrastructure function. II is inextricably linked with policy and regulatory support for a suitable economic and institutional framework and ICT-related training for a skilled population. This paper, therefore, discusses regulatory, investment, institutional, and educational elements of the knowledge strategy. It discusses the economic and institutional framework related to the rollout and general application of ICT, that is, not only policies, regulations, and investments in telecommunication, or the Internet networks and postal and media systems, but also the legislative agenda for e-commerce and e-governance. It discusses the need for training, to provide a workforce with the general skills required to use the new ICT. Finally, the paper touches upon the World Bank Group's role as a knowledge center for ICT, collecting and disseminating best practices in the areas of II and ICT applications to help our clients learn more cheaply and efficiently. Special initiatives are discussed in Annex 5, but will be considered in a broader review of the World Bank Group's knowledge work, currently being led by the office of the Managing Director for Human Development. The review aims to better identify the scope, interrelationships, and value of the various elements of the "Knowledge Bank," and to develop a single strategic framework for the World Bank Group's knowledge work. The review will be completed during the second quarter of FY02.

Beyond the knowledge strategy outlined above falls the application of ICT in World Bank Group projects. ICT can be divided into two parts. First comes the hard and soft infrastructure through which information travels (II). A second component is the applications and content that rely on or travel through II—a health information web site or a radio program, for example. In the World Bank Group's interaction with client countries, II has traditionally been under the telecommunication divisions of the International Finance Corporation (IFC) and the World Bank, (now the Global Information and Communication Technologies department or GICT). Applications have been implemented under the umbrella of sector-led projects and special initiatives, accounting for approximately

\$1 billion per year of World Bank lending.

After an extensive consultation process, it was decided to focus this paper as a business strategy concentrating on II. The ICT sector is dynamic—frequently changing at an exponential pace. Combined with this constant evolution is a span of applications that reaches across not just the Knowledge Economy Strategy but also the Comprehensive Development Framework (CDF), covering structural, human, physical, and sectoral development. ICT applications have a role in improving government, facilitating better development of health care, expanding access to infrastructure, and promoting rural development, for example. Because IT is a tool, defining its role in sectoral

projects can only be accomplished after priorities for that sector have been agreed upon, and means to achieve them have been set. Such a process is clearly the responsibility of each sector and country department. It would be a Sisyphean endeavor to attempt to construct a single detailed strategy for the World Bank Group's use and support of ICT applications across sectors and regions. Thus, the SSP does not go into detail on sectoral applications of ICT, such as management information systems (MIS) in the health sector, or IT applications in transport or finance. Instead, this paper provides a strategy covering II that can be implemented and measured by GICT in close cooperation with World Bank Group regions and sectors.

Definitions

The *Information and Communication Technologies Sector* covers the underlying technologies, knowhow, products, and services, as well as the companies (operators, suppliers, producers), consumers, policymakers, regulators, and other institutions and partners directly involved in or affected by the production, delivery, and regulation of ICT products and services. It includes the telecommunications and broadcasting sectors, as well as information technologies. For the purposes of this strategy paper, it also includes postal services.

ICT sector reform involves changing the overall policy, legal, institutional, and regulatory framework with the objective of opening markets to private investment and competition, thus fostering innovation, efficiency, and improved services. Sector reform involves the design and effective implementation of reforms, including change management and training. ICT sector reform is as much about stimulating growth, re-engineering business processes, or rethinking the delivery of public services, as about the application of technologies.

Information and Communication Technologies consist of hardware, software, networks, and media for collection, storage, processing, transmission, and presentation of information (voice, data, text, images).

Information infrastructure refers to the telecommunication and information networks through which information is transmitted, stored and delivered, as well as the embedded technologies and knowhow. Types of networks include cellular, data, broadband, backbone, satellite, broadcasting, multimedia, the Internet, and other networks; they may be wireline, wireless, or a combination of both. Network components may include terrestrial wires, undersea cables, radio waves, satellites, towers, base stations, equipment (transmitters, repeaters, switches, routers), and related hardware and software. Networks may be independent, or interconnected and interoperable. They are “public” or “open” if they can transmit information from any source, or “private” or “closed” if they are restricted to members of a closed user group. Providers of II services include the operators of the various networks, as well as specialized network services such as Internet service providers (ISPs), web hosting companies, and data centers. In this paper, the term information infrastructure also encompasses postal networks. II is the foundation of the information or knowledge economy.

Information technology refers to the creation, storage and processing of data, including hardware (computer networks, servers, storage devices, and desktop computers), system software (operating systems, middleware, programming languages), and software applications.

Applications are created using software tools; they can be standardized (“off-the-shelf” or “shrink-wrapped”; downloadable; or hosted by application service providers or ASPs), customized (building on an existing off-the-shelf platform), or custom-designed. IT applications serve different purposes, such as knowledge sharing (portals, search engines), public administration (tax, customs, social security administration, public expenditure systems), social services (health management, educational software), and business solutions (corporate back office systems, including payroll, accounting and billing; e-commerce applications).

Content refers to the actual information and knowledge created by individuals and groups that may be processed, transformed and presented by information technology and carried through the information infrastructure (material on web sites or online library systems, news, video, etc.). The availability of information technologies and infrastructure are powerful tools contributing to the creation, transmission and sharing of content (including local content).

Convergence in communications, computer and media technologies, and markets is increasingly blurring the lines between these categories and creating new challenges for policymakers and industry players.

Nonetheless, there is some discussion (in a stand-alone Chapter Five) of broader ICT issues facing the World Bank Group, and the paper does map out a plan for expanding the institutional development capacity in order to successfully implement the strategy. It is therefore expected that this SSP will trigger further discussion on how to use ICT as an enabling platform to improve the effective delivery of World Bank Group services. Special initiatives related to ICT are discussed in Annex 5, but proposals for change in this area are being discussed in the context of the broader Knowledge Strategy being put together at the Managing Director level.

The Strategy is founded not only on a vision of what the World Bank Group should and can accomplish, but also a realistic assessment of how and what we need to change to be effective in this new environment. We are suggesting new approaches, and new instruments, that continue to position the World Bank Group as a leader in this field, so that we can make a real difference in the lives of people in our borrowing countries.

The SSP is organized as follows. The first four chapters deal primarily with the World Bank Group's rationale, role, and strategy in the II sector. Chapter One presents the rationale for World Bank Group involvement in the II sector. Chapter Two reviews the World Bank Group's past activities in this sector. Chapter Three, which forms the core of the strategy, identifies the priorities for future World Bank Group operations. Chapter Four considers the institutional changes that will be required to support the successful implementation of the strategy, and discusses a proposed Good Practice replacement for Operational Policy 4.50. Finally, Chapter Five broadens the discussion to ICT applications, education and the World Bank's knowledge initiatives, discussing elements related to quality assurance processes.

Chapter One: Information Infrastructure and Development

This SSP sets out a significant role for the World Bank Group in the II sector. Our vision is for the World Bank Group to be a catalyst in improving access to II and promoting its use for stimulating development and reducing poverty. Before this vision and the new strategic directions can be explored, however, four key questions need to be answered about ICT, development, and the role of the World Bank Group:

- What is the current state of the digital divide in developing countries?
- Is II really relevant to poverty reduction?
- Is inequitable access to II a public policy issue?
- Why should the World Bank Group be involved?

The chapter takes up these questions and concludes that II is important to economic development and that there is, after all, a broad agenda for World Bank Group action in the II sector.

The current state of the digital divide

The oft-cited opportunity for the developing world is to harness the power of information and communication technologies to leapfrog ahead economically by developing its capacity to compete in the global knowledge economy. The stark reality is that access to the tools for knowledge and wealth creation is still highly inequitable. In many cases, developing countries lack the legal and policy frameworks, II and ICT applications that have enabled Organization for Economic Cooperation and Development (OECD) countries to exploit emerging technologies.

Given the formidable challenges, the growth of II in developing countries has been impressive. From 1995 to 1998, developing countries connected more than 171 million fixed telephone lines, 238 million mobile subscribers, and 8 million leased lines. The number of fixed and mobile phones per capita in low- and middle-income countries has increased more than fourfold over the past decade.²

This encouraging picture obscures the chasm between rich and poor nations in advanced II—the digital divide. Although the average OECD country has roughly 11 times the per capita income of a South

Asian country, it has 40 times as many computers, 146 times as many mobile phones, and 1,036 times as many Internet hosts (Pyramid Research, 2000). The situation is even worse in relation to Africa. In 1999 there were only 1 million Internet subscribers on the entire African continent compared with 15 million in the U.K. Excluding South Africa, Africa generates a mere 0.02 percent of global Internet hosts. A similar divide affects more traditional forms of II such as the posts, with more than 700 letters sent per person per year in the U.S., compared to less than one letter per person per year in Chad. Access to broadcasting services, such as radio and television, is more egalitarian, although still very unequal. Residents of low income countries own 1.5 radios for every 10 people, compared to 13 radios per 10 people in high-income countries.

Inequitable patterns of access to II are also visible within countries. In Panama and South Africa, households in the wealthiest quintile are respectively 43 and 125 times more likely to have private telephones than those in the poorest quintile. In Ethiopia, where over 60 percent of the population is illiterate, 98 percent of Internet users have a university degree. There are also significant access gaps between men and women and between rural and urban populations. In China, for instance, 75 percent of Internet users are men, and in India female participation in computer sciences courses in the country is around 25 percent. Having said that, the ICT sector is in many countries contributing to increased employment and economic opportunities for women. For instance, in the Kerala Technopark in India, women form nearly 40 percent of the computing work force.

Is II relevant to poverty reduction?

The existence of gross inequities between the rich and the poor is by no means confined to II. Poor people in developing countries not only have less access to II, they also have fewer schools and teachers, fewer doctors and nurses, and a lower calorie intake per capita than people in wealthy countries. Are these concerns more relevant to the fight against poverty than access to a telephone or the Internet?³ In fact, the debate cannot be framed in these terms. II, and the ICT applications that rely on II to function, are increasingly important in the delivery of services such as health and education, in the creation of economic opportunities for poor people, and in amplifying the voices of the poor. It is not a matter of choosing between II and health, II and education, but instead that of choosing the most effective way for II to help in the delivery of health, education, and small business development services.

Both traditional and emerging II offer a whole new avenue for development with particular relevance to poor people. On the one hand, the relatively low cost and wide reach of traditional II like radio, TV, and posts make these communication services vital to the lives of the poor (Box 1.1). The 2001–02 *World Development Report* will emphasize the evident importance of the broadcast and print media in promoting transparency and improving the quality of government services. On the other hand, widespread adoption of new II like the Internet for knowledge dissemination and sharing, delivery of business and public services, and wealth creation and collaboration in OECD countries, suggests that greater Internet adoption in the developing world will also be critical. In the context of the World Bank Group's mission to

reduce poverty in the developing world, II offers the following key benefits:

- major opportunities for development and global integration in ways that need not run counter to the social identity of traditional communities;
- increased economic and social well-being of the poor and empowerment of individuals and communities; and
- enhanced effectiveness, efficiency, and transparency of the public sector (including the delivery of social services).

Economic opportunities

It is already widely recognized that traditional telecommunication infrastructure has a positive and significant impact on economic growth, an important factor in poverty reduction.

At the microlevel, telecom investments in low and middle-income countries tend to generate internal rates of return of approximately 20 percent, and economic rates of return that are even higher. At the cross-country level, a graph that looks at countries with more or fewer telephones than one would expect given their income in 1980, and gross domestic product (GDP) growth rates over the next 18 years suggests a potential link from telecommunication rollout to economic growth (Figure 1.1). Countries that had more telephones—or a higher teledensity—than one would expect given their 1980 income level, saw higher growth rates between 1980 and 1998 than those with relatively low teledensity. The median growth is about a doubling of income per capita over the period. Only 29 percent of countries had fewer telephones than expected and faster than median growth, or more telephones than expected and slower than median growth.

A large number of econometric studies support this

Box 1.1: Posts and Radio as a Force for Development

There are more than 650,000 post offices worldwide. For many of the poorest, postal services are the most important means of communication, as is made clear in the joint World Bank and Universal Postal Union discussion of *The Postal Industry in an Information Age*.⁴ It is frequently the only method to transfer funds over distances, for example. Mail services have an important social role as well, particularly for families of migrant workers. In the new economy, e-business is actually generating additional mail as people and businesses buy goods online from distant suppliers—thereby increasing the importance of a strong postal network.

Radio as an information delivery mechanism has several advantages. First, it is among the cheapest forms of mass media. This is one reason why radio density in a developing country is usually a factor of 10 greater than teledensity, and radio accessibility is also far higher. Second, radio signals can penetrate remote geographic regions and any individual within listening distance of a radio set can receive information, regardless of literacy, visual impairment, or educational level. Finally, rural radio provides region-specific information, easily incorporates local concerns and feedback, and can operate in local languages. Radio programs have been used widely in education, to promote a range of health issues and practices, and to support activities such as gender training or drought mitigation programs. The Internet can also be used to leverage the power of the radio, as a tool to transfer programming between stations, and to provide an information source for broadcast programming.

linkage between telecommunication and growth⁵ (it should be noted though, that these results have been disputed,⁶ and it is empirically very difficult to estimate with any certainty the size of an ICT-growth relationship based on cross-country analysis);⁷ other studies, such as the U.S. Department of Commerce's *The Emerging Digital Economy II*, highlight the strong correlation between IT and national prosperity.⁸

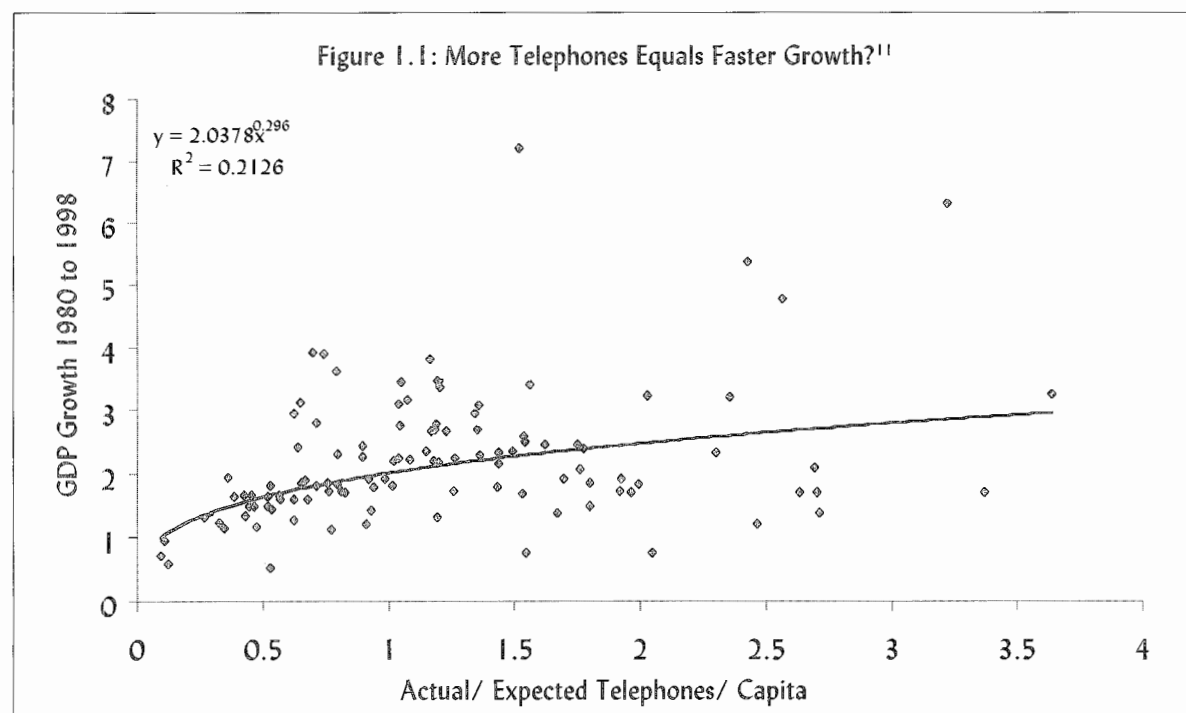
With the advent of the Internet, it is likely that the economic benefits of networking will be even greater in the future. Companies in the developing world can more easily access global markets and, in some cases, integrate themselves into global supply chains. Remote, small communities can begin to sell output directly to buyers without having to go through middlemen. And many services have become "tradable commodities" for the first time. While the software development industry that has sprung up in southern India is perhaps the best-known case, there is an increasing number of examples of this phenomenon. Examples from India include processing of insurance claims for General Electric, back-office work for HSBC, digitization of handwritten airline tickets for British Airways, dictation of patient medical records from U.S. doctors, and keeping accounts for the World Bank Group. IT-enabled services in India in 1999 had a turnover of \$5.7 billion.⁹ While still in their infancy, these "teleservices" promise to create employment opportunities for people in developing countries that previously would have been available only through migration.

Cross-country evidence on the impact of the Internet on economic growth is sparse to nonexistent given the fact that the technology is so young. However, there is some evidence that IT might be behind the strong growth in the U.S. economy in the late 1990s. Between 1995 and 1998 IT industries might have contributed as much as 35 percent of U.S. real economic growth, and there is some evidence that IT investment has been a factor in the recent uptick in U.S. productivity figures.¹⁰

Poor people can benefit from increased access to information as much as the rich. The poor have a number of information needs that can be met using ICT, as was revealed by a recent needs assessment study of the use of ICT in four villages in northeastern Thailand. Participants said that, among other things, ICT could be used to:

- regularly update information on the best prices of rice offered by various rice mills;
- access news of ways to improve yields, including information on crop disease, fertilizers, and experiences of other rural communities;
- enhance computer skills for young people seeking employment;
- interact with neighboring communities to promote peaceful coexistence, prevent thefts, and fight against drugs;
- air grievances directly with public officials; and
- communicate with relatives working or studying in other provinces.

Because of these largely unmet information needs,



the impact of network access in poor rural areas can be very significant. In Bangladesh, the installation of a rural telephone line generated revenue savings to local businesses worth 13 times the cost of service. Looking at the Internet, a number of studies suggest that even poorly-educated rural poor in places such as Bangladesh, Guyana, India, Peru, and Thailand use e-mail and Internet-based information services to their advantage where such services are available (Box 1.2).¹²

Costs of exclusion

However, just as poor households that lack access to modern water and electricity services pay more to meet their basic needs for hygiene and energy, those that lack access to a telephone (particularly in rural areas) often pay more to communicate. The poor have many information needs—crop prices, information on markets and weather, health and education resources, on local development projects, and communication with family and friends. Without modern ICT, poor people pay more in terms of time and money to get that information (Box 1.3). Even more important is the cost of exclusion in missed opportunities from communication that fails to take place without access to II. Rural areas without access to telephony in Botswana and Zimbabwe generate significantly less off-farm income than areas with a telephone.¹⁴

Historically, a cross-country regression analysis undertaken by GICT suggests that the combined features of relative scarcity among the poor, and the potential to increase income has, in fact, made telephone network rollout a force for growing inequality. While poverty has its roots in lack of opportunity, empowerment, and security (emphasized in the 2000–01 *World Development Report* on poverty), econometric analysis suggests that inequality in access to II can amplify the

Box 1.2: IT in Rural Thailand

Sanit “Nanoi” Thipnangrong had only four years of schooling as a child, but she took just three months to learn how to work a computer. Four kilometers down a dirt road in the outskirts of Buriram province in Thailand’s impoverished Northeast, Nanoi’s computer is kept in her house, not far from where her chickens roam. A small shoe factory up the road pays her electricity costs in exchange for keeping their accounting records in her spreadsheets.

Nanoi keeps her own spreadsheets to track vegetable prices to decide what to plant and when in the small field surrounding her home. She monitors her expenses and at the end of each season, calculates her costs and makes adjustments to use cheaper fertilizers, or alternative farming crops for the next planting. And she uses the Internet to ask university professors for agricultural advice.¹³

Box 1.3: The Cost of Exclusion

Kisiizi Hospital is located in Kigezi District in southwest Uganda, some 400 kilometers from Kampala. After repeated fruitless attempts to secure a telephone connection from the national provider, the hospital resorted to installing its own satellite telephone. However, satellite charges are high at \$2.50 per minute, or more than 10 times the rate offered by the public telephone company. Given that a round-trip bus fare to Kampala costs \$12.50, it becomes cheaper to travel to the capital than to make a five-minute phone call. Thus, for example, a nurse who needed to know the date and duration of a training course she was going to attend, gave up trying to telephone for the information after being put on hold for 10 minutes. Instead, she took the next 4 a.m. bus service, which, after an uncomfortable six-hour ride, delivered her to Kampala where she was able to register for the course.

impact of these problems. The regression analysis suggests that, allowing for income, countries with one standard deviation higher teledensity than average at decade start will see a 6.5 percent increase in inequality over the decade. Splitting the sample by teledensity does indeed suggest that this relationship is due to limited access among the poor at low levels of per capita GDP. Growth in teledensity was negatively (although insignificantly) related to inequality growth in the high teledensity sample (where access to the network was ubiquitous). In the low teledensity sample, where telephone lines are concentrated among the wealthy minority, the link between teledensity and inequality remained strong.¹⁵ While historically the poor have benefited from telecommunication rollout through its impact on broad economic growth, they have received little benefit in terms of direct impact through access to a telephone.

There is also some evidence that IT rollout in developed economies might have benefited skilled (comparatively wealthy) workers far more than the less-skilled, once again leading to growing inequality. This might suggest that the diffusion of the Internet in developing countries, if it is allowed to occur in a similar manner to that historically true for telecommunication rollout, will also be a force for both growth and growing inequality. In fact, without ameliorating actions, the Internet might be an even stronger force for inequality than has been the case for the telephone historically because:

- it is more expensive than telephone access;

- it requires a higher level of education and skill to operate;
 - the dominant languages of the Internet are not those spoken by the poor; and
 - it requires access to skilled personnel, electricity, and a critical mass of users to make it sustainable—these are especially lacking in the rural areas of developing countries, where most of the poor live.
- II development is contingent on reform and a strong regulatory environment.
 - Market failures and equity considerations suggest a role for international donor support of private investment, and a role for market-based subsidies to promote rural access.

Reform and regulation

Both economic growth and equity considerations suggest the importance of ICT to the development process and to implementing the Comprehensive Development Framework. Increasing access among the poor will have a twofold impact: increasing country growth rates to the benefit of all, and limiting growth in inequality within countries.

Improving government and public services through ICT applications

The Internet is also a powerful tool for improving the efficiency and quality of a wide range of public services that are important for poverty reduction, especially education and health. For instance, learning through satellite broadcasting or the Internet can dramatically increase the range and quality of teaching materials in isolated schools, or those with poor resources; while telemedicine techniques enable doctors in developing countries to consult with national or international specialists over the Internet. A more complete description of potential ICT applications to public service delivery together with a range of examples is provided in Annex 4.

ICT applications also have the power to transform government and the processes of governance at many levels (e-government), such as:

- the automation/digitization of administrative functions—procurement, tax returns, and registration procedures to gain efficiencies and cost savings;
- electronic delivery of all “citizen-facing” services through a convenient one-stop web portal to improve the accessibility and “user-friendliness” of government; and
- the ability of the Internet to greatly increase the transparency and openness of government by making it easier for citizens to access information, and more importantly, to participate in the political process (Box 1.4).¹⁶

Is there a role for the public sector in improving access to II?

Despite the remarkable dynamism of the private sector in promoting and implementing II, there are two important reasons why the public sector must be involved, in order to help close the digital divide:

There is enough evidence that private, competitive provision of II services in developing nations has a dramatic impact on service rollout, including services to the poorest.

For example, a recent study suggests that privatization, good regulation, and a competitive mobile market (with at least three mobile companies) could double the number of lines per capita in some of the poorer markets in Africa.¹⁷

However, private sector investment will only materialize to the extent that governments take the necessary reform measures by passing (and subsequently enforcing) enabling legislation, restructuring markets and institutions, and conducting the necessary divestments. While there has been substantial progress toward sector reform around the world—especially in cellular, where approximately 60 percent of the global markets are open to competition—a great deal still remains to be done. A recent global survey found that about half the world’s countries have yet to privatize their state-owned telephone company, while two thirds have yet to introduce some form of fixed competition.¹⁸ Even in countries that have begun the reform process, weak regulatory institutions and strong vested interests often hinder the growth of active competition. The reform agenda has become increasingly complex and pressing over time. Countries that are behind cannot afford to implement reform in the same gradual way as the early reformers, lest they continue to fall behind and lose competitiveness. Furthermore, the rapid growth of mobile communication has reduced the investors’ appetite for incumbent fixed line operators. Thus, the developing country governments that have yet to begin the reform agenda face a more

Box 1.4: The Internet as a Means of Political Participation
The Indian NGO, Sakshi, had faced difficulties in lobbying for sexual harassment legislation. With help from international women’s networks through the Internet, Sakshi was able to receive advice and technical assistance on legal issues relating to sexual harassment. The group succeeded in convincing the Supreme Court of India to establish sexual harassment guidelines in workplaces and brought the issue within the purview of human rights violations.

demanding task than their predecessors (Box 1.5).

Beyond sector reform, a knowledge economy can flourish only when supported by a robust public policy and legal framework.

Electronic commerce, for example, requires supporting policies and legislation to assure the security and legality of transactions conducted over the Internet. A country's ability to benefit from the economic opportunities offered by the Internet depends on the availability of suitably skilled labor, which is in turn a matter for national education policy. Finally, the incentive to connect to the Internet depends on the availability of locally relevant content, which is subject to substantial scale economies. The government is potentially a large provider of locally relevant content, and its use of the Internet for public administration functions can be a powerful catalyst to wider adoption of the medium. There is a role for international donor support here, to bring global best practices to bear. (Annex 2 suggests some generic country issues to be addressed in information infrastructure development policy.)

Finally, many important aspects of II, such as satellites and transoceanic cables, are international in nature, and require global cooperation. The cross-border flow of information, vital to global e-commerce, raises the need for international harmonization of e-economy regulations and technical standards. Governments therefore have an important role to play in securing the necessary international agreements. These efforts have required, and will continue to, require support

from international standards setting bodies such as Internet Corporation for Assigned Names and Numbers and the International Telecommunication Union (ITU), and there is a role for donors to support developing country participation in such ventures.

Market failures and equity considerations

Although sector reform is the first and most important step in extending access, there are a number of reasons to believe that the market alone will not provide a sufficient level of connectivity. Foreign investment flows to developing countries respond to a number of factors beyond policy environments. Small, isolated countries without a tradition of attracting such investment are at a disadvantage regardless of their policy regime. Weak infrastructure is also a deterrent to investment flows, suggesting the potential for a vicious circle of foreign investment in infrastructure services in particular.²¹ Evidence regarding private investment in telecommunication in developing countries suggests that it is concentrated in relatively few markets. Over the 1990–00 period, 10 low and middle-income countries attracted 67 percent of all private investment in telecommunication in that country grouping, despite accounting for 37 percent of gross national income. In large part, this concentration of investment will be the result of differing policy environments, but it might also reflect discrimination by foreign investors against small, isolated and relatively unknown economies.

In addition, there is lower interest in investing in developing countries after the substantial increase in the cost of capital and the sharp correction in equity markets, which affected the II industry in particular (Box 1.6). Huge capital expenses for main players in home markets are leading to general retrenchment from emerging markets. Large telecom players are over-leveraged, while international banks are overexposed to the telecom sector, and suppliers have become more risk averse. This has resulted in negative sentiment for the entire II industry, forcing main players to focus on their core markets (mainly OECD countries) and on cutting investments as well as debt, and it is affecting fund-raising also for second and third tier players. Most of the financing options for II projects in developing countries have effectively been shut off.

The financial volatility of the sector, combined with the rapid pace of technological change, puts significant pressure on policymakers and regulatory agencies to be flexible. The financial and technological volatility suggest the need for not only international support to leverage private investment funds, but also support for ongoing policy and regulatory development. It should be noted that the nature of the sector

Box 1.5: The New Realities of Telecommunication Sector Reform

In September 2000, the auction of 40 percent of Nicaragua's state-owned telephone company Enitel failed. Four previous attempts to sell the company had also failed since 1995. In October 2000, the auction of 51 percent of Honduras' state-owned telephone company Hondutel also failed. In both cases, the only bidder in the auction failed to match the government's minimum bid price. Sale of 20 percent of Egypt's telecommunications company, originally slated for October 2000 as well, has been postponed due to fears that the initial public offering was overpriced.¹⁹ A range of other countries, including Bulgaria and Turkey, have also faced difficulties. The increasingly complex environment for fixed-line telecommunications privatization, combined with the growing urgency of sector reform in order to expand access to the tools of the information revolution, suggest the importance of a new approach to fixed-line privatizations based on rapid movement toward full competition and expanded access, combined with realism over potential proceeds.²⁰

Box 1.6: Worldwide Climate for II Investment

The funding difficulties for Internet companies are well known. Yahoo, for example, has seen its stock price fall from \$250 in January 2000 to \$16.25 in March 2001, and the new-technology-heavy U.S. NASDAQ has seen market capitalization over the same period fall from \$6.7 trillion to \$3.2 trillion. Telecommunications operators have seen similar funding difficulties. Large telecom operators (viewed as traditional IFC project sponsors) have been involved in heavy spending on third generation mobile (so-called "3G") cellular licenses and networks. In Germany and the U.K. alone, 3G license auctions brought in \$81.2 billion, and just two recent major acquisitions (France Telecom's purchase of Orange PLC and Deutsche Telekom's purchase of Voicestream) totaled \$88 billion. As a result, many major telecommunications companies have been put on credit watch with negative implications or downgraded altogether by the major rating agencies, some several times in the last couple of years (British Telecom was downgraded to AA+ by S&P in May 1999 and then again to A in August 2000; France Telecom to AA in December 2000, down to A- in February 2001; and Deutsche Telekom to A- in October 2000 for example). Telecom suppliers have also been hurt by increased competition and reduced loan quality due to increasing default rates among their clients. The result has been a downgrading of their credit ratings (Lucent is now rated at BBB- by S&P).

These actions have directly contributed to the increasing cost of borrowing for telecommunications companies, with spreads rising from between 0.5 percent to 0.75 percent in April 1999, to over 2.0 percent in March 2001 for lead international operators, and below 1.0 percent in March 1999, to over 2.5 percent in March 2001 for major telecom suppliers.²² At the same time, eroding investor confidence, fuelled in part by increasing debt burdens to finance 3G license and network costs, growing competition in domestic markets, as well as overall negativity about the technology sector in general, have caused stock prices to plunge (in some cases by more than 91 percent in the last year alone). This has effectively closed off the equity markets as an alternative source of financing for these companies.

The combination of rising borrowing costs and difficulties accessing the equity markets have resulted in a curtailment of noncritical investment plans for many of these companies. As a consequence, many of them have scaled back their international expansion plans, especially in the emerging markets, where most are unwilling to take on the additional risk given their current situations.

demands flexibility from donor agencies involved in providing advice and assistance, a point returned to in Chapter Four.

Given the economic importance of II for poor and isolated communities, and the high cost of rural provision, there will often be a case for public intervention to promote universal access (at a level appropriate to a country's development), as well as the provision of local public good ICT content.

There are a number of regulatory mechanisms that can help extend access to II. These include coverage requirements, or rollout targets with a geographic component. Some 20 countries around the world have introduced, or are in the process of introducing universal access funds. One model is for private operators to be invited to bid for service provision in areas that are not commercially viable, in return for a subsidy financed from the universal service fund. A concession contract is awarded to the company requesting the smallest subsidy. In Chile, for example, this mechanism has been used to leverage \$40 million in private investment on the basis of just over \$2 million of public subsidy. As a result 1,000 public telephones have been installed in rural towns, at around 10 percent of the cost of direct public provision. Subsidies of this kind could also be used to support the development

of Internet-enabled community centers, content relevant to low income groups and people who speak languages that are not well represented on the web, and community postal and radio facilities.

Finally, the capacity to use technologies to provide skilled labor to the local ICT industry, as well as to foster a domestic entrepreneurial base are all crucial. Foreign investment or employment will go where the best low-cost, highly skilled labor is available. While the market is providing solutions to the need for skills development through private sector training institutes, in many developing countries skills shortages continue to be a crucial bottleneck. The market failures connected with education are well known, and the need for government involvement is widely accepted. Government support backed by donors can effectively provide ICT human capacity in developing countries.

Does the World Bank Group have a role to play?

The opportunity costs of not developing proper legal, regulatory, and technological infrastructures for the knowledge economy are very high for developing countries. The majority in the developing world has been effectively shut out of the economic and social gains

that new technologies have afforded the rich. Developing countries are increasingly looking to the international donor community for more sophisticated products and services to help them develop a robust II sector. World Bank Group investments in II are needed now more than ever to counterbalance the declining financing options in the debt and equity markets for telecommunication operators in developing countries.

While these issues have already attracted substantial international attention and private sector investments in the developing world are growing, the World Bank Group has a unique and significant role to play in improving II. Its broad range of skills, knowledge, experience, and tools gives it unique strengths that differentiate it from other donor bodies and make it an attractive partner to the private sector. Our comparative advantages include:

- A unique ability to influence policy and support the kind of systemic government reforms and legislative changes needed to take full advantage of ICT across a wide range of economic and social sectors.
- The ability to draw together different constituencies spanning government, private sector, and non-governmental organizations (NGOs) to work together toward a common purpose.
- A substantial accumulation of expertise in the ICT field combined with a rare degree of country specific knowledge. Through its project portfolio during the 1990s, the World Bank Group has developed a detailed understanding of II in 76 countries around the world.
- A wide range of assistance tools—from equity investment to private and public loans to grants—with global reach. Critically, these include a wide range of risk-mitigation measures that provide a level of comfort to private sector operators and financiers in little-known markets.
- A proven record of highly successful investments—IFC investments in the II sector attract \$8.7 of outside private financing for each dollar of IFC funding, for example, while World Bank telecommunication projects have scored very highly in rankings of projects meeting CDF targets and in Operations Evaluations Department (OED) reviews.²³

Recent initiatives like the joint United Nations Development Programme (UNDP)-World Bank hosting of the G-8 DOTForce initiative reinforce the importance of partnerships in leveraging the resources and competencies of a wide range of players that are working to extend the reach of II. Given its unique strengths, the World Bank Group is well positioned

to forge new partnerships with donor agencies, technology companies, and civil society organizations, and to play the coordinator to help ensure that resources are used to maximum effect. The Development Gateway Foundation illustrates such an opportunity.

With the creation of the ICT Global Products Group, the World Bank Group's tools and knowledge and extensive II portfolio are now all housed in one central department. Although organizational deficiencies remain, including the need to clarify sector operational responsibilities, GICT is in a strong position to provide the range of services needed by our client countries to improve access to II. While the World Bank Group needs to build its skills base in community access programs, e-commerce, e-government, and supporting the local development of content (including website construction), this process has already begun. Recognizing its potential, the donor community believes that the World Bank Group should play a major role in II for development, as evidenced by the conclusion of the G-8 Okinawa charter on the global information society.²⁴

Turning to education and applications of ICT, the World Bank Group has developed a significant portfolio and expertise here as well. On the human resources side, it has already undertaken a number of projects that use ICT from the radio to the Internet to deliver education, especially to remote areas. On the applications side, the World Bank has a large portfolio of projects with IT components, as well as a history of using ICT to deliver information on issues including health and the environment. With the recent investment in TV Africa, the IFC has also become involved in content and broadcasting with a significant development dimension.

The World Bank Group's activities can, and will, be only a small part of efforts required to overcome the digital divide. The scale of the problem and the World Bank Group's available resources suggest that we can only be one of many actors. Having said that, the World Bank Group's catalytic role, combined with its experience and expertise, should allow it to leverage these resources. In coordination with its development partners the World Bank Group can make a significant impact in this area.

Chapter Two: Past Performance and New Challenges

The World Bank Group has a strong record in the telecommunication field. To date, the Group has a portfolio of 60 stand-alone telecommunication and IT projects in the public sector, totaling \$4.5 billion.²⁵ In addition, at the end of FY01, 97 private sector projects have been approved by IFC, with a total IFC funding of about \$4.0 billion, including \$1.8 billion from IFC's own account. The recent OED/Operations Evaluation Group (OEG) review of activities in the ICT sector identified it as one of the best performing sectors in the Bank's portfolio.²⁶ In the 1990s, the World Bank Group moved successfully from lending to state owned enterprises to providing policy and regulatory advice to the public sector, and investing in private telecommunication providers. Nonetheless, the OED/OEG report pointed out, too little management attention has hampered the World Bank Group's ability to maximize sector impact (Box 2.1 summarizing the main OED/OEG recommendations, management's response and how this SSP deals specifically with the recommendations).²⁷ The report also noted the need to move beyond the agenda of the last few years to offer client countries a wider range of tools to improve access to II.

Operations

Policy and technical assistance

The World Bank has seen a significant change of focus in telecommunication activities in recent years. Following Operations Policy 4.50 (OP 4.50) in 1995, World Bank Group telecommunication projects shifted away from investment lending to state owned enterprises, and toward technical assistance (TA) and policy-based lending for sector reforms designed to encourage private investment flows.

Sector reform policy specified a three-pronged approach comprising privatization, to bring in additional capital and management skills; competition, to expand services and encourage efficiency; and regulation, to ensure fair competition, reasonable prices, and universal access. The scope of World Bank Group activity in supporting sector reform has been impressive. According to a recent International Telecommunication Union (ITU) survey,²⁸ more than 88 countries around the world have privatized the incumbent operator—a measure of reform progress. It is estimated that around

63 countries relied on World Bank Group support (grants, lending or TA) for some part of a sector reform program.²⁹ Nonetheless, many developing and transition countries still have to embark on privatization, suggesting the agenda is far from finished.

This change of emphasis led to a substantial reduction in the overall volume of lending to governments. Comparing World Bank Group projects approved in the years before (1992–95) and after (1996–99) OP 4.50, the average annual value of new lending fell by about 85 percent from \$578 million to \$79 million, while the size of the average loan shrank from \$66 million to \$13 million (Table 2.1). Investment in post-1995 loans has by and large been limited to spectrum management equipment and rural access.

While the dollar value of World Bank Group lending has declined, there is accumulating evidence that the development impact per dollar spent has dramatically increased.

Compared to lending to state owned enterprises, World Bank Group resources invested in sector reform have the power to leverage a much greater volume of

Table 2.1: Overview of New Bank Group ICT Operations in the 1990s

	Period	Total Value (US\$m)	Total Number of Projects	Average Annual Value	Average Project/Invest. Approval Value	
LOANS	WB II ³⁰	1992-95	2,312	35	578	66
		1996-99	315	24	79	13
	IFC	FY1993-95	788	21	263	38
		FY1996-01	2,613	63	435	42
	WB IT Applications	Recent	1,000 + pa.		1,500	-
GUARANTEES						
MIGA	2000	111	-	111	-	
GRANTS						
InfoDev	1998-00	53	240	17.7	0.22	
PTF	1994-98	0.3	11	0.1	0.03	
PHRD	1991-96	2.8	14	0.5	0.2	
TATF	1991-99	1.9	27	0.2	0.1	
PPIAF	2000	0.9	8	0.9	0.1	

investment, due to the opportunities created by privatization and liberalization, as well as the confidence afforded by a sound regulatory regime. A recent review of Latin American experience found that countries that privatized saw telephone penetration grow 40 percent faster than otherwise, while full liberalization increased this differential to 160 percent. Peru, in particular, has seen impressive results due to a World Bank Group-backed reform program (Box 2.2).³¹ Nor have these results been confined to Latin America. Some of the poorest African countries have witnessed an explosion in telephone penetration following the licensing of mobile operators. In Uganda, for example, the licensing of a second national operator in 1998 led to 120,000 new mobile lines in two years—more than twice the number of previously existing fixed lines. Telecommunication reform has set the pace in World Bank Group client countries, establishing precedents and acting as catalyst for broader reform in various other infrastructure sectors such as energy and transport.

The OED/OEG report identified a number of factors under World Bank Group control that contributed to project success. In particular, the study found that single sector loans tend to perform better than multisector loans packaging reforms across a number of public services. The faster pace of change in an innovative telecommunication sector, which has only increased with the advent of the Internet, makes it

significantly different from other infrastructure sectors. This makes the combination of II reform with broader infrastructure reform a cumbersome instrument. Thus, among ongoing stand alone projects evaluated by the OED/OEG report, 7 percent were deemed to be at risk but with no actual problem cases, while among multisector loans 18 percent were at risk and 15 percent had become problem cases. It is also a matter of concern that there is a trend toward increasing the number of multisector TA projects. Other important success factors identified by the OED/OEG report include World Bank Group staff continuity, sequencing of sector assistance, and the World Bank Group's long-term presence.

Investment assistance

Catalyzing private investment

Given the shift toward private sector financing of telecommunication infrastructure in recent years, the IFC has increasingly played the lead role in the World Bank Group in new but selective investment activity (Table 2.1 and Figure 2.1). Average annual IFC investment approvals in the sector grew from \$262.6 million in the years leading up to OP 4.50 (FY93–95) to \$435.52 million in the years thereafter (FY96–01). Of projects that reached the desk review stage (after a preliminary screening), the estimated ratio of rejections to approvals (for GICT's investment unit) was five to one.

To ensure its continued catalytic role in the sector,

Box 2.1: OED/OEG Recommendations, the SSP and Management Response*OED/OEG Recommendation*

The Bank should address outstanding policy gaps and differences in regulatory reform strategy regarding the sequencing of liberalization, universal access, and links to the Bank Group poverty-reduction agenda.

The Bank should promote the use of a broad range of instruments in the sector and differentiate product offerings by type of borrower, moving away from the use of multisector TA loans.

Regional and country strategies for ICT should be developed.

Partnerships and special initiatives should be streamlined, overall strategic responsibility for the II sector should reside with ICT Global Products Group.

Staff skills in the sector should be upgraded.

Monitoring and evaluation of projects should be strengthened.

Management/SSP Response

Management believes that the recent integration of Bank and IFC activities reduces policy gaps and differences; a common approach is being encouraged by active cross-involvement of Bank/IFC staff on projects. The SSP proposes guidelines on speeding the liberalization process and universal access programs.

Management notes the budget rationale of multisector projects, but concurs with quality concerns. SSP proposes expanded use of stand-alone II instruments including grant programs for small-scale TA and a range of investment lending instruments.

Management agrees with the need to expand regional and country strategies. SSP proposes increased level of GICT support for CAS and ESW work. In addition, *infoDev* is supporting country e-readiness studies.

Management agrees with the need for streamlining and a central role for GICT in II. SSP clarifies GICT role in II. The issue of special initiatives is to be addressed as part of the World Bank Group Knowledge Strategy being developed at the MD level.

Management agrees with the need for staff skills upgrading. SSP proposes expansion of staff numbers and of staff training in order to ensure skills are available for an expanded program of project offerings.

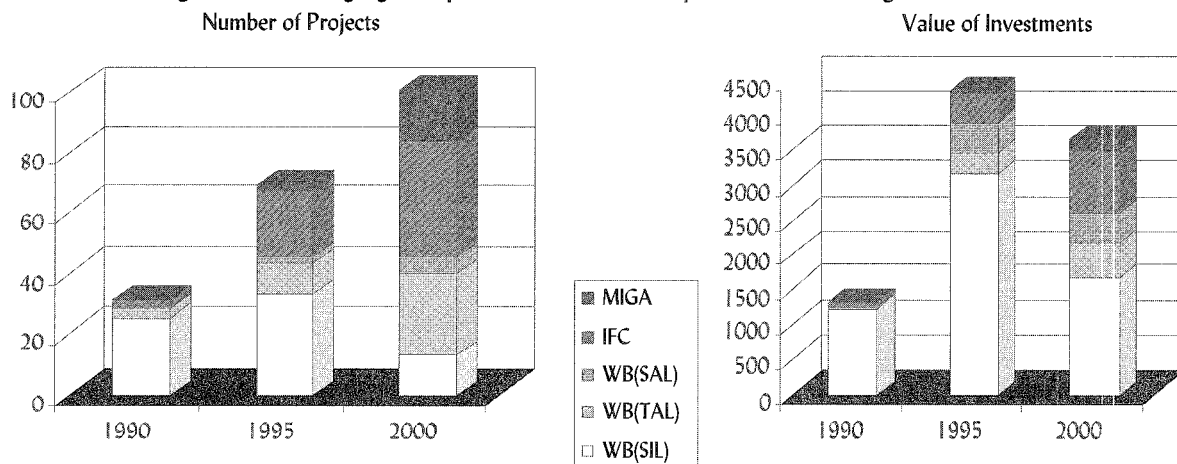
Management concurs with the need for improved M&E, notes that stand-alone II projects include monitorable indicators. SSP proposes list of indicators to be monitored to determine project and strategy success.

Box 2.2: The Impact of Peru's Telecommunication Reform

In 1993, the Peruvian government embarked on a major reform of its telecommunication sector, supported by Bank lending of approximately \$50 million (as part of multisector technical assistance and policy-based support). New laws enacted in 1993 and 1994 provided for the privatization of CPT and ENTEL (the two state-owned utilities) and the establishment of an independent regulator (OSIPTEL). The mobile telephone market was partially liberalized right away and is now fully competitive; 172 companies are currently active. The privatization contracts included substantial obligations to install public telephones in rural areas, and following market liberalization in 1999 a Universal Service Levy of 1 percent was introduced to finance the Telecommunication Fund (FITEL) dedicated to meeting universal service objectives. The results are impressive:

	1993	1998
Sector Investments (\$ million)	28	2,099
Fixed lines (penetration rate per 100 pop)	660,000 (2.9)	1,850,000 (7.6)
Mobile telephone lines (penetration rate per 100 pop)	50,000 (0.2)	600,000 (2.4)
Public phones	8,000	50,000
Towns with phone service	1,450	3,000
Poor households in Lima with a telephone (%) ³²	1	21
Average waiting time for connection	118 months	45 days
Connection fee	\$1,500	\$150 ³³

Figure 2.1: Changing Composition of Bank Group II Portfolio during the 1990s



IFC has progressively shifted investment activity toward newer technologies and lower income countries over the past five years. On the technology front, IFC has shifted emphasis away from traditional fixed-line systems toward cellular networks, and has a small but growing portfolio of broadband and other Internet infrastructure companies. As of end of FY01, IFC's investments in cellular projects amounted to \$887 million, or 64 percent of the total.³⁴ As liberalization continues and incumbent monopolies expire, IFC is also focusing more heavily on the support of alternative national, regional, and local service providers. On a geographic basis, recent approvals show a shift away from Latin American countries, toward Sub-Saharan Africa. Within Latin America, IFC's efforts have shifted away from the larger, more advanced countries and toward lower income, less wealthy countries that are in greater need of investment.

IFC investments in the sector can be considered a success on a number of grounds. IFC funding has a very high mobilization rate³⁵—attracting \$8.7 of outside private financing for each dollar of IFC funding, compared to a \$4.4 average for the total IFC portfolio in FY99. Estimated equity returns are double the IFC average, and 85 percent of net IFC commitments sampled received a satisfactory or better rating on contribution to the growth of the economy. Mobile investments performed particularly well.

A sample of seven IFC cellular investments across regions from Bangladesh to Venezuela illustrates the significant impact cellular investments can have on improving access to telecommunication.³⁶ Besides having mobilized \$8.7 from other sources for each IFC dollar invested, IFC's catalytic role is even more significant when looking at the new lines created through the IFC investments (IFC typically finances a three-year investment program after which most cellular

companies become self-financing). A snapshot of each project taken three years after the IFC investment shows that each \$1,000 invested by IFC created between 7 to 28 new telephone lines, with an average of 14 lines per \$1,000 (Box 2.3).³⁷

Improving and expanding the network of a project company increases competition and stimulates total market growth. A snapshot of the cellular markets after three years in the sample countries shows more than 9 million cellular lines had been built. This roughly equals the total number of existing fixed lines in the sample countries in 1995, and is triple their fixed-line growth between 1995 and 1998. IFC's investment is, of course, not solely responsible for market growth;

Box 2.3: Romanian Cellular Experience

In 1997, IFC raised a \$210 million financing package to help fund the initial build-out and operation of Mobil Rom. Mobil Rom and its competitor had been awarded Global System for Mobile Communications (GSM) cellular licenses for the operation of nationwide cellular networks. Prior to these license awards, Romania had one cellular operator serving 20,000 cellular subscribers in Romania's major cities at very high price levels.

Today, Romania is estimated to have 2.7 million subscribers, and prices for cellular service are among the lowest in Europe. This extraordinary growth allowed many Romanians to have access to telecommunications services for the first time.

Initially, the company tried to raise financing purely from commercial banks, but the banks indicated the need for a multilateral institution. IFC's \$50 million investment helped to successfully syndicate \$160 million from commercial banks and has, so far, resulted in more than 24 new telephone lines for every \$1,000 which IFC invested.

but total cellular line growth per each \$1,000 invested by IFC is a proxy for IFC's catalytic impact. Using this proxy, each \$1,000 invested by IFC contributed to market growth between 9 and 111 new lines, with an average 36 new lines per \$1,000.³⁸

Factors responsible for this success include the ability to react rapidly to market opportunities, strong regulatory regimes, a good macro environment, and the selection of strong management. The importance of the regulatory regime suggests the presence of potentially powerful synergies with World Bank Group TA, opportunities that can now be more readily pursued in the context of the new Global Products Group.

Investment guarantees

As of June 30, 2000, the telecommunication portfolio gross exposure of Multilateral Investment Guarantee Agency (MIGA) stood at \$187 million, supporting investments in eight countries.³⁹ Contracts of guarantee signed totaled \$111 million in 2000. MIGA's present telecommunication project pipeline, which focuses on the construction and/or expansion of mobile telephony networks, amounts to \$100 million, two-thirds of which will go to Africa. MIGA's telecommunication strategy for 2001 calls for an increase in its portfolio with regional concentration geared toward Africa, Asia, and the Middle East where the sector's gross exposure is lowest.

Grants

The Information for Development (*infoDev*) program is the largest and most visible of the grant programs for the ICT sector. Since 1998, *infoDev* has funded over 250 projects, providing on average \$17.7 million each year in grants (Table 2.1). The projects involve policy research and innovative applications and knowledge sharing activities, and relate to a range of applications in education, health, environment, government, and e-commerce. The *infoDev* projects have been particularly effective in:

- *networks and communities of interest* projects, intended to improve communication within sectors and support virtual communities with the help of websites, databases, or other information-sharing systems;
- *policy-related* projects, which foster a proper regulatory environment for the expansion of II;
- *capacity building* projects, to develop necessary human resources; and
- *pilot and demonstration* projects: small-scale models for testing ICT-based innovative approach to development issues.

Flagship procedures are used to promote initiatives that correspond to *infoDev*'s ability and comparative

advantage to respond to special circumstances and opportunities in a timely and flexible manner. The first three flagship areas, endorsed by the Donor's Committee at the end of 1997, focused on regulatory issues for the information age; technology in education; and connectivity in Africa. Electronic commerce was added in 1999. In FY01, *infoDev* also began to support the development of business plans and prototypes of country gateways in developing countries as part of the Development Gateway initiative. As of March 15, 2001 a total of 21 grants have been approved for \$1.3 million, and an additional 4 or 5 grants are expected within this fiscal year. *infoDev* has also launched a program to support e-readiness evaluations in developing countries (see Chapter Four and Annex 5 on the relationship between the Development Gateway Foundation and *infoDev*).

A number of trust funds have provided an average of \$1.7 million per year to finance World Bank Group II project preparation, as well as a range of TA and Economic Sector Work (ESW) activities. The Public-Private Infrastructure Advisory Facility (PPIAF) grant program in particular has played a significant role in the telecommunication sector with PPIAF activities totaling \$926,000 in the year 2000.⁴⁰ PPIAF projects span over a half dozen projects in countries including Algeria, Bhutan, Cambodia, China, Economic Community of West African States (ECOWAS), Paraguay, São Tomé, and Tanzania. In Algeria, for example, PPIAF provided support to the government in designing and implementing a liberalized telecommunication policy statement and legal framework, including a commitment to award a GSM license to a private operator in 2001.

Knowledge sharing

In 2000, GICT devoted just under \$0.5 million to knowledge management activities, while the World Bank Institute (WBI) and Development Economics (DEC) were also active in ICT research. The OED/OEG report noted that while Economic and Sector Work (ESW) has generally had high policy relevance, there still needs to be a strengthening of links between research and practice. A new trend in ESW has been to conduct country-level assessments of knowledge economy strategies, for example in China, Korea, and Thailand. Finally, the World Bank Group has been proactive in using the Internet as a means of disseminating knowledge about ICT, with a number of websites providing valuable information about the sector, such as MIGA's IPANet, the Africa Connection Online, and Technet, as well as the previously mentioned Development Gateway, Global Knowledge Partnership, and GICT's external website.

Chapter Three:

Strategic Directions in Information Infrastructure

The World Bank Group has contributed substantially to telecommunication sector reform worldwide. However, rapid evolution in the sector, convergence among information and communications technologies and the rise of the Internet have led to dramatic changes since the policy was last revised in 1995. The World Bank Group must respond to these changes with a dynamic new approach. Table 3.1 lays out what the World Bank Group will do differently in the sector as the result of a new approach towards II development.

There are four strategic directions for World Bank Group lending and investment operations as well as grant activities in the ICT sector for the next three years:

- Broadening and deepening sector policy and institutional reform to extend offerings beyond the telecommunication focus, to address postal and distribution logistics and media services, technology convergence, and the need for an enabling legal environment for the commercial and social development of the Internet.
- Improving access to modern II through a range of instruments that encourage private sector investment, and provide smart subsidies where the market will not reach universal access goals appropriate to a country's level of development on its own.
- Supporting ICT human capacity building to ensure there is a resident technical knowledge and skill base for exploiting ICT and developing a knowledge economy.
- Supporting ICT applications for business, government and citizens to harness technology for economic and social development in the developing world.

This chapter will discuss GICT's role in supporting the first two strategic directions, the core of the World Bank Group's II work. A new business strategy focused around the first two strategic directions has important implications for both the GICT department and the Bank's regions in order to achieve its successful implementation, given that the regions are responsible

for a broad array of country and sector policy dialogues. This chapter also describes the ICT research, knowledge-sharing, and global public good products needed to support these operations. Finally, it discusses an approach to prioritizing lending projects in II.

Developing and implementing ICT applications will be the responsibility of the units across the World Bank and IFC that possess the sector knowledge to identify appropriate uses for ICT, although *infoDev* will continue to support innovative pilots in these areas, and GICT will provide support to sectors to incorporate ICT applications on an as-needed basis. Using ICT in education and training, which will be the primary responsibility of the World Bank Group education departments, the WBI, and special initiatives, is discussed in Chapter Five. The issues involved in the provision of IT support are also discussed in Chapter Five.

Broadening and deepening sector and institutional reform

The starting point for improving access to II is to develop robust legal and regulatory frameworks and institutions that address the profound changes in this sector. Traditional sector reform focused narrowly on telephony services. Convergence and the overall importance of II to economic and social development require a broader scope of reform operations. Accordingly, sector and institutional reform will occur in four key areas:

- Ongoing telecommunication reform in countries that have not undergone basic market restructuring and privatization of the incumbent operator. This includes strengthening of regulatory institutions to ensure they have the capacity and credibility to implement and oversee sector reform.
- New policy frameworks for technology convergence and, in particular, regulatory support for the development of advanced Internet infrastructure.
- The creation of an enabling legal environment for e-commerce and e-government.
- Greater attention to previously overlooked sectors such as postal and broadcast.

Successful reform in these interrelated areas will have a dramatic impact on sector performance, boosting private sector investment and ultimately extending the reach of II to poor people around the world.

Continuing telecommunication reform

While many countries have already enacted successful telecommunication sector reform, worldwide this process is far from complete. The World Bank Group will continue to support telecommunication reform with particular emphasis on the many countries that

have not yet liberalized the sector or privatized the incumbent operator.

The World Bank Group will continue to assist countries in their efforts to expand competition and strengthen regulatory regimes. Even in countries that have completed II sector reform, the absence of a regulatory tradition and the scarcity of human resources generate a need, in the initial phase, to set up or strengthen a regulatory agency and accompany it in the transition phase to competitive markets. Mounting evidence from post-reform countries shows regulatory agencies often feel highly challenged in the discharge of their statutory duties, and without outside support, they will not function well. The World Bank Group will also give assistance to countries to move from telecommunication regulatory institutions to regulation for convergent information and communication industries as a whole (below).

Technology convergence and the Internet

The development of Internet technology has driven the convergence of previously distinct information, media, and telecommunication technologies, requiring a holistic view of reform. Indeed, the fact that voice

Table 3.1 What Will the Bank Group Do Differently in II?

	Current approach	New approach
Mission	Expand and modernize telecommunication	Extend access to a wider range of ICTs and related applications.
Policy and technical assistance	Telecommunication reform: competition, privatization, and regulation.	Facilitate convergence. Develop e-commerce/e-governance. Use posts and media. Expand access beyond the market. Build institutional capacity.
Infrastructure	Fixed and mobile voice and data networks.	Hard and soft information infrastructure, including Internet and Broadband networks. Regional solutions.
Applications	Strategic information systems. Project components.	Sector-based applications. E-government/e-procurement. E-commerce. City-to-city knowledge networks.
Instruments/vehicles	Traditional application of WB and IFC instruments.	Combining IFC/WB investments. New innovative instruments (venture capital, capital market facilities, local currency financing). Universal access funds. Public/private partnerships and cofinancing. Small technical assistance grants. Special purpose initiatives (IT incubators, e-readiness).

(telephony) and data (video, audio, images, text, etc.) can now travel seamless across the same networks, has forced regulators around the world to create coherent, sectorwide policy frameworks that permit consistency in the exercise of key regulatory functions (competition, licensing, frequency management, interconnection, etc.) across sectors. This suggests that, in some cases, regulatory authorities for IT, telecommunication and broadcasting services might be merged. These institutions will need assistance in creating an attractive investment and regulatory environment for building broadband and wireless networks that will provide a platform for all forms of communication. For example, many countries will require support in conducting 3G wireless spectrum licensing auctions similar to those that occurred in Europe and the U.S. In particular, competition law and policy will become increasingly important in a converging communications sector. The World Bank Group will provide an ongoing program of support to assist client countries develop the institutional capacity to respond rapidly to the challenges presented by the dynamic and evolving nature of the II sector.

Convergence activities will be supported primarily through policy-based and TA operations, although investment components may sometimes also be required. While TA is the primary vehicle for delivering these activities, Morocco is a good example of a new generation project that integrates telecommunication, IT, and postal sector reform (Box 3.1).

Enabling legal and regulatory environment

As the Internet becomes a primary platform for wealth

Box 3.1: Integrated II Reform in Morocco

The II Sector Development Loan in Morocco, approved by the Board in May 2001, is an adjustment operation supporting the government's reform program to develop a modern and extended II, and an integrated approach to reform in the telecommunications, IT, and postal sectors. The main reforms contemplated in each sector are:

- *Telecommunications*: pro-competitive reforms for market liberalization (including issuance of new fixed licenses), strengthening the regulatory environment of the sector, and privatization of the historical operator.
- *Information technology*: development of a legal framework for e-commerce, and the creation of interministerial networks at the local and central levels.
- *Postal sector*: introduction of greater competition and private participation in the sector, modernization and diversification of the public postal operator, and extension of postal and financial services to the poor, and to remote areas under a newly defined universal service policy.

Box 3.2: *infoDev* and E-Readiness

infoDev has launched the ICT Infrastructure and E-readiness Assessments Initiative that provides grants to help developing countries evaluate their II. Grant funded activities are expected to result in an assessment using an appropriate methodology that is tailored to identify strategic opportunities for progress, and develop an action plan which addresses the opportunities and bottlenecks identified, with special attention to the policy framework and the availability of qualified human resources. As of July 20, 2001, a total of 16 grants have been approved, and it is expected that an additional 15 to 20 more grants will be approved this fiscal year.

creation and public service delivery, developing countries need to assess their readiness to develop a knowledge economy. The World Bank will therefore support country-specific e-readiness studies as the basis for defining a national ICT strategy (Annex 2). These studies, which cover a wide range of sectors and activities based around the use of ICT including education, intellectual property rights, e-commerce laws, and the environment for entrepreneurship, will be funded by *infoDev* grants (Box 3.2), ESW, or as the first part of a larger knowledge economy project. The recently completed OECD-World Bank report for the Republic of Korea provides a model for such a review of a country's knowledge economy. Initiatives are also occurring in Algeria, China, Tunisia, Turkey, Uganda, and others. These broader studies must be collaborative, involving experts from sectoral and regional units in issues such as competition policy, financial systems, and fiscal policy. Frequently, GICT will play only a supporting role in these initiatives—for example, the Korea report was led by a group from WBI with input from GICT.

For countries that have progressed beyond the definition of strategy, the World Bank Group will provide TA for the implementation of the necessary legal and regulatory changes that will enable a knowledge economy to flourish. GICT will undertake legal and regulatory reform in conjunction with the legal department, regions, and sectors with specialized knowledge—such as Poverty Reduction and Economic Management (PREM) and other parts of Private Sector Development (PSD). This includes the enactment of legislation and appropriate regulations to deal with questions such as the legal status of electronic contracts and digital signatures; the privacy and security of data transmission; the protection of intellectual

property; the tax and duty treatment of electronic transactions; the facilitation of electronic transactions in an environment of low credit card penetration; and the policing of e-commerce as a means of building trust. Support for e-commerce legislation and frameworks of “cyber law” oriented toward the Internet are already being provided under the World Bank Information Infrastructure Development Project in Indonesia, among others.

Greater attention to postal and media

Any strategy that seeks universal access to basic II cannot ignore postal services and mass communications media, such as radio and television. Postal and broadcast services have often been overlooked in the process of telecommunication sector reform. The World Bank Group will play a much more active role in these sectors for four reasons:

- First, the relatively low cost and wide reach of the postal and broadcasting sectors make them particularly relevant to the poor. Postal services and radio broadcasts are often the only communication services able to reach the most isolated rural communities. While the Internet is accessible to about 4 percent of the world’s population, radio is heard by as much as 80 percent of the people of many developing countries.⁴¹ In South Africa, about 65 percent of the country have access to television, and over 98 percent to radio.⁴² Post offices too are widely accessible in developing countries (there are more than 154,000 in India alone), and play important roles as financial intermediaries and delivery systems for private and government services.
- Second, the increasing volume of commercial transactions (B2B and B2C) on the Internet makes modern postal services an essential infrastructure for the customer fulfillment end of e-commerce. Post offices can also provide a location for the provision of public Internet access and e-mail. For example, Jamaica’s IT strategy calls for all Jamaicans to have an e-mail account, accessible through their local post office, by 2002.
- Third, these “traditional” technologies are powerful development tools in their own right. Surveys of education interventions find interactive radio instruction considerably more cost-effective in raising test scores than teacher training or books, for example, and more than 50 percent of farmers surveyed in Zambia reported that farm radio forums had helped them increase crop yields.⁴³
- Fourth, the media and postal sectors are lagging behind telecommunication in policy reform, suggesting a significant need for policy and technical advice in these sectors.

As with telecommunication, major institutional, legislative, and regulatory postal reforms will provide the means for revitalizing the II sector by increasing competition and private sector participation. Postal sector reform is only starting, and postal operators in member countries will require support during the transition phase to adapt to a more competitive market environment. Private sector participation is initially more likely to come through new entry, as well as management contract and concession-type agreements, rather than full-scale privatization. World Bank investment and TA lending may be justified during this transition period to help state-owned postal enterprises remain viable in a competitive environment while they prepare for privatization. The World Bank Group is already experiencing strong client interest in postal sector reform, with concrete projects or initial discussions already underway in 19 countries.⁴⁴

Many countries need to overhaul their regulatory regime covering broadcast media, either due to the lack of coherence of existing regulations or to the complete absence of any regulatory framework. The World Bank Group will support an increased range of operations to prepare institutions, legislation, and regulations for the new technological environment. Reforms will include making the broadcast spectrum available to a range of private and community stations, providing a regulatory structure that promotes broadcast services appropriate for the poor, and local languages subtitling. Expressions of interest for support in broadcasting sector reform have been received from Belize, Kenya, Pakistan, Romania, Tanzania, and the Organization of Eastern Caribbean States (OECS).

Improving access to II

The core of the World Bank Group’s II strategy is to increase infrastructure coverage in underserved demographic and geographic areas of the developing world. While experience to date demonstrates that introduction of competition has a strong influence on increasing access, other measures, such as public subsidies for community access centers, will also be necessary to make II an accessible resource for all of the world’s poor. Accordingly, the strategy for improving access to II is built around four key activities:

- promoting new entry and competition through policy reform;
- stimulating private sector investment in hard and soft II through IFC, MIGA, and *infoDev*;
- extending access beyond the market by supporting a range of innovative public access initiatives; and
- exploiting cross-sectoral synergies with other rural infrastructure projects.

Stimulating private sector investment

With the convergence of IT and telecommunication, IFC's investment strategy is shifting from basic telephony networks to facilitating the rollout of low-cost mobile services and broadband Internet connectivity in client countries. The bulk of IFC's investments will support new competitive operators providing cost-effective services to consumers. A broad range of technology platforms and services will continue to be supported by IFC, including fixed, wireless, satellite, cable, and fiber optics projects, with an increasing emphasis on broadband (high capacity) connectivity. In some cases, IFC will consider broadband regional networks, where economies of scale can be gained by amalgamating the needs of several small countries.

IFC will tailor its investment program to meet the development needs of the client country. In more advanced markets, IFC will focus on reaching beyond the urban areas and on increasing competition. These countries will also provide opportunities for IFC to explore more advanced technologies. In developing countries the focus will be to increase the penetration of basic services. IFC has already experimented with investing in rural telephony, including the Grameen Phone project that supported the cellular-based public telephones provided by microenterprises in rural Bangladesh. IFC will also support multicountry projects for major II investments including backbones, satellites, and transoceanic fiber optic cables.

IFC will expand efforts to catalyze the rollout of the Internet-enabled II in client countries. In most IFC client countries, construction of this infrastructure is currently in a nascent phase. The main II services that support the Internet are:

- **ISP:** As the first point of access for individuals and business, these firms increasingly provide a range of integrated data services. IFC will focus on replicating successful business models and in transferring cost-effective technical solutions.
- **Web hosting:** Companies typically outsource the physical hosting and maintenance of their websites to improve service quality and allow users to share the cost of skilled technical staff, hardware and software. As the quality of the Internet backbone improves in a country, IFC will consider investing in this segment—the next level of infrastructure. In addition, IFC will invest in selected Internet applications, software, and e-commerce providers.
- **ASP:** ASPs provide a software application to customers via the Internet. The application is hosted and maintained remotely, reducing the need for heavy in-house IT investment within companies. Given current constraints in quality and bandwidth

of local connectivity, IFC will focus on applications in this market with greatest end-customer impact.

- **Software products and services:** This segment comprises a broad range of firms. At one end of the spectrum are software service companies, which provide contract programming services to external clients. The other end consists of “shrink-wrapped” product companies with proprietary intellectual capital in areas such as finance/accounting, logistics, operations, or language translation. IFC will invest in a range of software companies in view of their role in the local II as well as offshore revenue generation potential.
- **E-commerce:** The fast-evolving experience of the Internet indicates that “brick and mortar” firms reap most of the benefits. Internet-only companies face high barriers in establishing a purely online presence. IFC will focus on building II to enable all firms to participate in the new economy. Nonetheless, selected opportunities in e-commerce with strong partnerships in the brick and mortar world will be considered for IFC investment.

Within IFC, GICT has taken the lead role in investment in companies providing hard and soft infrastructure related to the Internet, and has partnered with other regional and industry departments on investments in companies that *apply* technology to an economic and/or social activity. Examples include distance learning (eGuruCool.com) and commercial exchanges (AsianPaperMarkets.com). IFC will continue to take a cautious view in entering new investments in this field (Box 3.3).

Incubator projects, which provide seed money packaged with a range of support services to start-up companies, offer one means of stimulating different applications. The promising track record of private-public, and in some cases purely private sector, incubators indicate that they can play a key role in jump starting the local environment for entrepreneurship. *infoDev* is positioning itself to play a leading role in promoting the development of private sector technology companies through incubators (Box 3.4).

MIGA will play a growing role in supporting private investment in the sector, expanding its support for investments in cellular operations in particular. For instance, in FY00 MIGA backed \$230 million in political risk insurance to a loan syndicate to support investment in a cellular network in the São Paulo region of Brazil, which is expected to add 2 million new subscribers over the next two years.

GICT will leverage the synergies of the joint IFC/World Bank approach in addressing the tight correlation between sector reforms and improving access to II. For example, in Ghana, a joint approach to the

Box 3.3: Investing in IT in Developing Countries

In order to help ensure that IT reaches developing countries, IFC created an Information Technologies Investments Group in April 2000, in GICT.

This new investment unit was established to strengthen IFC's support for emerging technology companies in the developing world through transfer of the latest technologies from developed countries into developing countries, as well as support to the development of local entrepreneurs and technologies. Focus areas for investment include IT services specifically connected with the Internet (such as Internet service providers, web hosting, and storage), as well as enabling technologies, software and services, IT enabled services (such as call centers and business process outsourcing), and applications (such as e-finance, health, and education).

Some examples of recent investments include:

Sigma—A leading Indonesian IT services firm, Sigma provides software and technology solutions for the financial services industry, Internet access to individuals and corporations, cabling and networking activities, and web site design and hosting. Sigma also operates BaliCamp, a software development outsourcing company. IFC support enabled the company to position for growth in local and overseas markets.

Spryance—This company provides remote services in the health information services industry, enabling creation of large numbers of skilled jobs in India. The company is focused on the medical transcription market, using a web-enabled process to serve expanding markets overseas.

Rubico—A South African developer of business software, Rubico develops open-source software primarily for the financial services industry. Their products and services include developing complete corporate-wide systems and enabling software programs, as well as system integration. IFC support is helping the company to expand, providing an important example of locally-developed technology with global applications.

telecommunication sector greatly enhanced our development impact. The World Bank provided TA to improve the strength of the regulatory regime, while the IFC is investing in Ghana Telecom only after the company complied with license agreements, which will lead to expanded access for Ghanaians. Similarly, in Morocco, the IFC invested in the mobile sector after the World Bank had supported the opening up of mobile competition.

Extending access beyond the market

While privatization and liberalization of the telecommunication sector have been highly successful in expanding access, the benefits of reform have been concentrated in higher-income urban areas. The low-

er revenue potential of low-income rural and periurban communities, combined with the higher cost of servicing isolated rural locations, have tended to prevent these groups from sharing equally in the gains of reform and limit the extent to which the access gap to a range of IT can be narrowed on a purely commercial basis. The World Bank Group will therefore pursue five strategies to help extend access to rural and marginal urban areas:

- support policymakers in setting suitable universal access objectives (based on the level of service provision likely to be sustainable) and defining the scope of services;
- assist policymakers in identifying regulatory mechanisms for reaching access objectives;

Box 3.4: *infoDev* Incubators

Over an initial three-year period, the *infoDev* Incubator Initiative plans to establish a network of incubators to facilitate the emergence and development of small and medium ICT enterprises in developing countries that are expected to have a significant development impact. *infoDev* is to serve as the central hub of the incubators network, providing funding for studies to establish best practices, a comprehensive knowledge base, and practical networking assistance. Under the initiative, starting in FY02, *infoDev* expects to work with governments, corporations, research institutions, and other organizations in developing countries. Grants are planned to cover several activities for one or more incubator locations in a developing country and include some of the following: connectivity packages for incubator companies, including equipment, Internet access, applications and related facilities; technical assistance, including provision of legal, financial, management, marketing and other expertise; promotion of ICT start-ups where front-end subsidies are justified; and a financial endowment to local incubators enabling incubators to use revolving funds to achieve financial sustainability and promote further expansion, and to provide microcredit on a case-by-case basis.

- support universal access funds;
- facilitate public-private cofinancing of infrastructure investments; and
- promote local participation in community-based access center initiatives.

The World Bank Group will provide assistance to governments and regulators that are trying to define realistic universal access objectives, and to establish comprehensive frameworks for universal service that are consistent with a liberalized market, and can be financed at affordable cost by national budgets or II users at large. Particular attention must be paid to potential risks of public investments, such as distorting market conditions with ill-conceived interventions, betting on the wrong technologies, or making investments that eventually fail to yield commensurate benefits.

The World Bank Group will provide TA for the design and implementation of policies or regulatory mechanisms that help countries meet their objectives for universal access. Several different mechanisms to improve access are available to policymakers, such as service requirements, license conditions, and incentives for existing operators and new entrants to service commercially risky areas. A few examples:

- Service requirements can be presented in the form of rollout targets for private lines, teledensity targets, targets for public facilities such as pay phones or telecenters, quality of service levels, targets to reduce waiting list, or minimum time to fulfill requests for connectivity.
- Licenses can be awarded to the bidder that offers the largest build out plan, rather than the one offering the highest license fee.
- Less profitable or unattractive areas can be bundled with lucrative areas within the same license area.

The World Bank Group will also help develop several universal access funds and lending programs. These funds could be used to finance public telephones and multipurpose community technology centers, together with related Internet promotion activities, and community radio stations in isolated rural and semi-urban areas. These universal access programs will benefit from the lessons and experience of ongoing support to rural telecommunication development funds in Guatemala, Nepal, Nicaragua, and Peru through TA activities. Eight countries around the world have introduced a universal access fund for telecommunication, and a further 11 are in the process of doing so.⁴⁵ A number of small-scale telecenter initiatives are already underway with *infoDev* funding in Peru and Senegal.

Based on existing experience, the most promising

mechanism for cofinancing is a fund that allocates partial investment subsidies on a competitive basis to private sector operators who agree to build and operate II services in commercially unattractive areas (Annex 3). This is an approach that employs the output-based aid methodology highlighted in the forthcoming Private Sector Development Strategy. In these arrangements, the World Bank will provide resources to cover a public subsidy, while in some cases, IFC will provide financing for the private sector component of these investments. World Bank funds will be provided to support onetime subsidies covering a portion of the capital costs of private sector rollout.

The World Bank Group will encourage local participation to enhance the chances of success of innovative communal facilities.

Experience in South Africa, for example, has shown that a self-financed (except for a limited subsidy for initial investment and training) telecenter program can be sustainable when focused on demand-driven initiatives, and managed by local entrepreneurs or community organizations with a vested interest in success. There is considerable potential to replicate this kind of experience elsewhere. A planned project in Thailand will support the rollout of public Internet access through local civil society organizations, using participatory project design techniques to ensure that such centers target information needs identified by the poor themselves.

Special initiatives, including World Links for Development (WorLD) and the Global Development Learning Network (GDLN), will also continue to play an important role in extending infrastructure, both through TA and pilot projects. The Information Solutions Group (ISG) of the World Bank is already playing a significant role in improving access to broadband technologies in country offices and, through them, to government units working with the World Bank—a capacity that is being exploited by the GDLN to provide global audio-video links. ISG will explore options to increase access to this bandwidth for local NGOs or academic institutions in an upcoming review of its operations.

Exploiting cross-sector synergies

Universal access projects fit well into the World Bank's wider rural development agenda and, in line with the CDF, offer the possibility of exploiting cross-sectoral synergies with other rural infrastructure initiatives, for example in the energy sector (Box 3.5). The World Bank, in its universal access lending operations, will push for a comprehensive ICT poverty survey as the first stage in designing such programs. These surveys will use participatory techniques to ascertain the II

Box 3.5: Energy for Rural Transformation Project in Uganda

The Energy for Rural Transformation Project aims to go beyond the standard rural electrification model by using energy as a catalyst for the development of a range of other rural activities with high social and economic value, including agriculture, small business, telecommunications, health, and education. In the case of telecommunications, the project will provide both TA and investment finance for a rural telecommunications fund under the auspices of the Uganda Communications Commission. The project will also use pilot telecenters to explore the potential for Internet use in rural areas.

resources of poor people, their information needs, and perceived methods of meeting such needs.

Knowledge-sharing, research, and global public goods

As with lending operations, there is a need to focus the World Bank Group's knowledge sharing and research agenda on new economy issues. The novelty of the Internet in developing countries means that much remains to be learned about how the new technologies benefit poor communities, and how World Bank Group operations might best be designed to maximize and enhance these benefits. Much of the existing evidence on ICT and poverty alleviation is still anecdotal and fragmentary in nature. A more comprehensive research initiative would incorporate the following elements:

- compiling case studies on experiences from pioneering countries as an important vehicle for sharing best practices;
- performing a rigorous quantitative assessment of the costs and benefits of ICT interventions through household survey-based monitoring and evaluation exercises in pilot projects and larger scale operations, such as adaptable program loans (APL) and learning and innovation loans (LIL);
- expanding and updating the relatively narrow ICT content in the World Bank's living standard measurement surveys (LSMS); and
- creating databases that provide an overview of ICT infrastructure and capabilities in developing countries to provide a basis for benchmarks and identifying new investment targets.

The World Bank Group needs to disseminate the findings of the research activities identified above. To

this end, GICT's external website will be designed as a one-stop-shop, allowing visitors to access quantitative and qualitative information on the ICT sector by country and topic, as well as disseminating best practices including the good practice document proposed in Annex 1. In addition, it is expected that the development of a knowledge strategy will have substantial impact on knowledge sharing within the institution. Both knowledge sharing and research activities will continue to be led by Development Economics Research Group (DECRG) and WBI.

As well as knowledge activities, the World Bank Group has an important role to play in supporting client country participation in global institutions that set rules governing II. Already, the World Bank is an observer to the United Nations Commission on International Trade Law (UNCITRAL) Working Group for drafting model e-commerce legislation. Through *infoDev*, the World Bank has supported a number of initiatives including assistance for developing countries to participate in the World Trade Organization (WTO) telecommunication agreements, and ITU regulatory colloquia tackling issues such as reform of accounting rates regimes. The World Bank Group supports such participation to ensure that the needs of developing countries are reflected in the agreements reached.

Priorities

World Bank Group operations in II should focus on countries and regions within countries where II has the greatest potential to contribute to poverty reduction, and where it can work most effectively with partner agencies. The overarching goal is to focus lending and investments in projects where the World Bank Group can make a difference. Bank services and interventions will be matched to communities, countries, and regions only after a comprehensive needs assessment is completed, and our role *vis-à-vis* partner development agencies has been clarified. In this context, it will be important to ensure that the role of II in helping to meet the goals set out in the Country Assistance Strategy (CAS) is routinely considered during the process of CAS formulation. GICT will offer support to World Bank country teams that are in the process of determining whether II is a binding constraint to client country development, and thus where support for the development of II should be a priority. GICT has prepared a first stage screening methodology to illustrate the comparative development of II across countries as a tool to use in this process.

Factors that might be relevant in such a decision on prioritization for different types of assistance include:

- Countries where there is a significant government commitment to reform and sector growth.
 - Countries that have not made significant progress toward sector reform. These are potential priority countries for World Bank Group policy based and TA projects.
 - Countries that have started the reform process, but face significant costs in reaching universal access due to their large dispersed rural populations; and countries that due to their small size, suffer from diseconomies of scale in infrastructure. These are potential priorities for World Bank Group investment support.
 - Countries that, while moving ahead in the reform process, are considered unattractive by institutional investors, and may therefore find it harder to attract private investment. These should be a priority for IFC and MIGA support.
 - Rural and remote areas where II network provision is complex should be a focus of access programs.
 - Minority ethnic groups, women, and the disabled should also be a focus of network access and applications support.
 - Countries that are best placed to benefit from the Internet revolution, and the development of alternative II. For instance, this might be because of a strong tradition in technical education that provides the skilled labor needed for teleservices. These should be a target for the development and implementation of knowledge economy strategies, as well as IFC and MIGA support.
- Selectivity will also be exercised in terms of instruments. For example, in low income countries and regions, the focus will be on basic connectivity, while at the same time exploring the potential of IT in promoting social and economic development. Support for policy reform, investments covering convergence technologies and their applications to business, and the delivery of public services such as broadband, will receive greater attention in wealthier regions.

Chapter Four:

Implementation Strategy

Given the potential of ICT to reach all sectors and support all areas of World Bank Group focus, it is important to have a clear division of responsibilities and a coordinated approach across the World Bank Group. This chapter discusses GICT's role in reform and access to II, the first two strategic directions laid out in Chapter Three. It then turns to the organizational improvements required to better deliver on these strategic directions. The chapter also proposes an approach for monitoring progress of the new strategy, examines the financial implications of the strategy, and outlines a new operational policy. Chapter Five will address some issues regarding the third and fourth strategic directions, namely education for ICT, and applications of ICT in other sectors.

Division of responsibilities

GICT will take the lead in World Bank Group operations that focus on sector policy reform and extending access to II (the first two strategic directions), although GICT will continue to collaborate closely with the regions, as with the Legal Operations Department (LEGOP) on legal aspects. Responsibility for broader e-economy reforms will be shared with the regions and other sectors including PREM. Responsibility for ICT education programs, with the goal of increasing the ICT human capacity base of our client countries, will rest primarily with the education departments of both the World Bank and the IFC, although GICT will work closely with them in a support capacity. ICT applications in other sectors will be the responsibility of sector units and regions. Again, GICT will play a catalytic and supporting role when necessary. As noted in the introduction, this SSP is firmly rooted in the World Bank Group's broader Knowledge Strategy, and is linked to the ongoing effort to develop a Science and Technology Strategy.⁴⁶

Organizational improvements

Organizational innovations will be undertaken along four lines to pursue the strategic directions set out in Chapter Three:

- *Management efficiencies:* We shall streamline our management and implementation approaches to respond creatively, quickly, and efficiently, including use of limited rapid technical support and an evolving approach to Internet investments.
- *Products and services innovation:* Through a process

of proactive business development, we shall innovate in our offerings and customize our approach based on country need. We shall use a wider range of instruments more effectively combined in order to support the broader strategic approach.

- *Knowledge and skills development:* We shall enhance our skills and knowledge to engage in a more complex environment, including an expanded program of learning from, and disseminating, our own experience.
- *External partnerships:* We shall develop new partnerships to leverage the work of external players that complement our approach.

Evolving our management approach

GICT will actively support World Bank country and sector management units in integrating ICT in CAS. In order to ensure that II is discussed as a potential input to meet the goals elaborated in Poverty Reduction Strategy Papers (PRSP) and CAS, and (if appropriate) potential programs are elaborated, GICT regional coordinators will collaborate with country teams to support analytic work and program development. Beyond the CAS program, GICT will also provide support for inputs into ESW.

One goal of further integration with the CAS process will be to expand the number of small, stand-alone TA loans, which have proven very effective in supporting a continued presence and extended reform in a number of countries (including Algeria, the Dominican Republic, Mauritania, and the OECS). The OED recommendations included strong support for expanding the number of such projects to replace the

current standard of an II component as part of a broader, multisector package.

Nonetheless, there remains no readily accessible funding mechanism to provide small yet critical volumes of TA with potentially large development impact through the leverage of an IFC investment in a timely and effective manner.

On a number of occasions (including in Ghana and Jamaica), IFC projects have turned up regulatory and institutional issues that hamper competition and private investment in the sector. In some cases, this has generated requests from country officials for World Bank Group TA support to improve the regulatory environment. These resources, needed in a timely manner, but of a scale significantly smaller than that supported by World Bank Group projects, might be provided by administrative budget funding used to support small amounts of TA by consultants on II related projects (“rapid response” funds).

This would enable GICT and other units in the World Bank to address sector problems, accelerating mobilization of private investments in a manner consistent with ongoing country dialogue. Assistance would be approved by and coordinated with the appropriate World Bank country director. Resources available from existing World Bank Group facilities and trust funds would support the capacity. *infoDev* would provide such TA in a manner similar to its Y2K activities. The Bank will continue to seek support from PPIAF, IFC Technical Assistance Trust Fund (TATF), special regional programs, and to provide reimbursable TA for this purpose. A “rapid response” TA capacity would be used to complement these resources where existing funds were not available or, for example, to cover the cost of World Bank Group staff time where this was not covered under the existing trust fund (as is the case with TATF). Because the focus of assistance is narrowly defined, specific to situations where World Bank Group activities have identified the need for brief advisory support or uncovered bottleneck inadequacies, and of short duration, there will be little overlap with other multilateral or bilateral grant initiatives.

On the IFC side, given the emerging nature of the sector, the size of Internet investments is often very small when compared with traditional IFC projects. The typical deal involves \$1 million to \$5 million in IFC equity or quasi-equity investment. In order to address this target group of firms in line with IFC risk and return objectives, a venture capital approach will be as follows:

- **Portfolio approach:** Venture capital return objectives are high for any given project because the risks are commensurately large. The portfolio approach

enables risk sharing while recognizing that failure rates may be higher than for traditional IFC projects.

- **Active management:** Given the high growth profile and early stage of investee companies, IFC will play a more proactive role in overseeing firm management. In many cases, this role will include an IFC staff person taking a seat on the board of directors.
- **Investing in projects that leverage IFC strengths:** IFC has the ability to add value to II companies in many ways, including via IFC’s client network in traditional sectors (e.g., telecoms, banking, infrastructure) and the policy dialogue with government.
- **Coinvesting with others:** IFC’s traditional role as facilitator of private investment applies equally to the technology arena. Coinvestment reduces the risk for IFC, while increasing the value added to the company in terms of management advice and networks.

Investment in these higher growth, higher risk companies requires a new approach within IFC, and a departure from traditional IFC project financing. For example, coinvesting with other venture capital firms and strategic investors requires increased responsiveness and streamlined investment procedures within IFC. A more active participation in overseeing management implies a heavier supervision burden, and greater continuity from investment processing to supervision. IFC has been working to evolve in this direction, and further strengthening of the program is planned.

Innovating our products and services

The World Bank Group will offer a wide range of services to support II development, will combine these to exploit IFC-World Bank Group synergies, and proactively present clients with potential development opportunities (Table 4.1).

All World Bank Group investments may be used to support this strategy. Table 4.2 and Annex 7 illustrate how the different instruments may be used in implementing the II elements of the sector strategy. IFC and MIGA’s II programs will continue to use the full range of investment and guarantee instruments available. On the World Bank side, it is expected that the use of TA investment loans will increase as we build on the positive experience of small TA loans dedicated to the sector, and the projects begin to support universal access programs, postal modernization, e-government reforms, and broadcasting initiatives. As these are new business areas for the World Bank, APLs and LILs may be particularly suitable. Grants, trust funds, and “rapid response” resources will be used to

Table 4.1 New Products and Services

Sector and Institutional Reform: Convergence policy, postal and broadcast reform E-readiness assessments and E-economy reform ICT country strategies Technical assistance Joint World Bank/IFC privatization operations Improving Access: Internet and broadband investments Loans for universal access and telecenters WB/IFC universal access packages Broadcasting/postal Venture capital funding for IT start-up companies IFC partial credit guarantees for local currency financing	Human Capacity Building: Investments in private technical/vocational schools E-economy training programs Sectoral Applications: E-government and e-commerce toolkits Business portals and other e-business applications Scaling up <i>infoDev</i> projects City-to-city networks for urban knowledge sharing and follow-up investment assistance Coordination and Internal Support: Enhanced II donor aid coordination Increased input into CAS/SSP/PRSP Expanded knowledge products
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support an increased range of TA, pilot projects, research, and project preparation.

Programmatic lending instruments such as the Poverty Reduction Support Credit (PRSC) and adjustment lending will also be used for advancing a variety

of II objectives. In this context, a key concern would be to ensure that such multisector instruments are sufficiently flexible and modular so that progress in relatively fast-moving sectors such as II is not hampered by blockages in other sectors.

Table 4.2 Using the Menu of Bank Group Instruments for II Development

Strategic Direction		Policy				Information Infrastructure Access	
		Telecom Reform	Regulatory Capacity Building	Postal & Media	E-commerce/E-government	Telecom & IT	Extending Reach of ICTs
Product Line		Instrument					
country specific	IFC Equity/Loans					√	√
	IFC TA				√	√	√
	WB Investment			√			√
	WB PRSC & Adj. Loans	√		√	√		
	WB TA	√	√	√	√		
	WB SAL/SECAL	√		√	√		√
	WB ESW/ Nonlending TA	√	√	√	√		
	MIGA Guarantees					√	√
	<i>InfoDev</i>	√	√	√	√		√
public good	Gateway Foundation, <i>InfoDev</i>		√		√	√	√
	Other Special Programs				√		√
	DEC/WBI		√		√	√	√

The GICT as a global products group will offer powerful combinations of instruments from different segments of the World Bank Group:

- fostering improved procompetitive policy and regulatory environments through World Bank Group TA and sector adjustment operations, including “rapid response” assistance in countries where potential IFC investment programs have uncovered regulatory inadequacies;
- facilitating the privatization of state enterprises through IFC preprivatization investments;
- supporting rural access through World Bank support for government programs and IFC investments in the private companies that will build out the infrastructure;
- developing innovative instruments and solutions such as venture capital and risk guarantees for capital market facilities; and
- scaling up *infoDev* projects through the use of IFC or World Bank investment financing.

The linkages among these instruments and between *infoDev* and GICT’s policy and investment arms will be strengthened. GICT will explore innovative project ideas and review ongoing projects to develop project proposals to be presented to World Bank Group client countries and the private sector. In a sector as dynamic as II, the need to evaluate new developments, foster innovation in both policy and investment design, and follow a proactive strategy of implementation is vital. The priority given by our client country governments to sector reform and wider access to II, the rapid pace of technological change and best practices, and the tightening of capital markets, all demand an expanded role for World Bank Group product lines and a greater capacity for rapid project rollout.

Developing our skills and knowledge

The human resources implications of the new ICT strategy are significant throughout the World Bank Group. Recruitment, training, and knowledge development programs will be adapted to the new strategy.

The mix of skills within GICT will be adjusted for broader scope. GICT will continue to maintain a strong core staff of experts in policy, regulation, and economics as needed to support telecommunication reform, which will remain a key activity. The new strategy, however, also calls for a broadening of sector reform to encompass the Internet, e-economy issues, convergence, and the postal and media sectors. This requires new expertise to be brought on board across the World Bank Group, which is already underway in GICT for the postal sector and other areas. Finally, delivery of an expanded program, while allowing increased time for staff to learn from the World Bank

Group’s own experience and develop new skills, will also require some net expansion of staff.

Leveraging external partnerships

At the country level, the World Bank will seek to ensure that donors’ consultative discussions review the range of II donor-supported projects that are in process, and identify opportunities for improved coordination to enhance impact and reduce wasteful duplication. An II sector-specific approach toward coordination is already being used, for example, in Indonesia. Bilateral cofinancing of World Bank projects through either direct injection of donor resources into a project, or independent sponsoring of related activities such as pilots, is another avenue being tried out.

GICT will take the lead in the development of other coordination mechanisms that can help leverage the efforts and resources of external players. The World Bank is already partnering with a number of development agencies in the II sector through instruments such as the *infoDev* donors committee, the PPIAF grant facility, and the German Trust Fund for Posts. The World Bank Group also continues an active dialogue with the ITU, WTO, UNDP, as well as with regional development banks. However, the II sector is attracting increasing donor interest, not only from bilateral and multilateral organizations, but also from a range of private sector players. Many NGOs are also active in this field, and are often at the forefront on social applications of ICTs. Most recently, following the G-8 Kyushu-Okinawa Summit, G-8 formed the DOTForce that developed concrete recommendations on bridging the digital divide. The World Bank Group hosted the DOTForce secretariat in cooperation with UNDP, and, as a result, it is expected that greater partnerships in this area will be developed by the donor community.

GICT will cooperate with the Development Gateway Portal for tracking the activities of donors, private companies, NGOs, and foundations with II focus and programs, and will identify partnership opportunities. Identifying potential synergies with external players is an efficient and cost-effective way to scale-up World Bank Group activities in the II sector. While still in the early stages of development, the Development Gateway Portal is creating a multiagency project database that offers project information by country, sector, or agency, eventually enabling GICT to see at a glance the range of II activities occurring in developing countries.

GICT (and particularly *infoDev*) will also work closely with the Gateway Foundation. Donors have requested a clarification of the respective roles of *infoDev* and the Gateway Foundation. The management

teams of both programs are working closely together to clarify their functions and ensure complementarity. GICT will be an active partner in the Gateway Foundation's efforts to create knowledge resources, and support research and training intended to diminish the digital divide.

The World Bank Group also will leverage external interest in the digital divide. GICT will seek to consult senior technology professionals in a more systematic manner in order to share experiences and plan joint ventures. GICT will also sponsor conferences involving experts, companies, and client countries to discuss topics such as models for privatization and extending access.

Monitoring and evaluation

Given the range of new activities that will be undertaken in the II sector, a monitoring and evaluation system will be set up. In line with OED/OEG recommendations, two levels of indicators will be used: those relating to the internal processes of the World

Bank Group, and those which capture the impact of World Bank Group activities in the countries concerned. Examples of such indicators are summarized in Table 4.3. The internal indicators reflect directly actions by the World Bank Group, and are relatively easy to track on a common basis for all projects in each class. Responsibility for reporting on their evolution will rest with GICT. The external indicators are more subject to exogenous influences, and are also significantly harder to measure. They are best tracked at the project level, and will be adapted to the context of each operation on a case-by-case basis.

The ultimate success of World Bank Group projects in the II sector is dependent on their poverty-reducing impact. However, as noted in Chapter One, this impact is spread across sectors—II is a tool for improving earnings opportunities, or health outcomes, or education performance, or empowerment. A “full accounting” of the impact of a particular access project, for example, on poverty, would require working through all of these various indirect impacts. This is a

Table 4.3 Key II Monitoring and Evaluation Indicators

	Internal Indicators	External Indicators
<p><i>Strategy Activities</i></p> <p>(a) Policy Focus</p> <p>—Sector Reform</p> <p>—Foundations of New Economy</p>	<ul style="list-style-type: none"> ◦Number of countries with operations by sub-sector (telecommunications, postal, e-economy, media) ◦Number of country e-readiness assessments ◦ICT elements in CAS/SSP/PRSP 	<ul style="list-style-type: none"> ◦Overall level of sector development ◦Cost and quality of service ◦\$million of e-commerce per capita ◦Level of employment in high-tech industries
<p>(b) Access Focus</p> <p>—ICT Infrastructure</p> <p>—Universal access to II</p>	<ul style="list-style-type: none"> ◦\$million invested in infrastructure and profitability of investments ◦\$million in financing mobilized (B-loans) ◦\$million invested in rural access ◦Participatory ICT-poverty surveys completed 	<ul style="list-style-type: none"> ◦Overall level of sector development^a ◦Cost, quality and volume of service ◦Number of competitors in sector/extent of competition ◦Service coverage in rural areas ◦Service coverage among the poorest ◦Number of (previously unserved) lines, users, subscribers added
<p>(c) Training Focus</p> <p><i>Knowledge Sharing and Research</i></p>	<ul style="list-style-type: none"> ◦\$million invested in training ◦Number of cases published ◦Number of LSMSs incorporating ICT 	<ul style="list-style-type: none"> ◦Cost of Internet skills ◦Number of people trained ◦Qualitative indicators of research output and website content
<p>^a For example, payphones per rural locality, telephones and Internet users per capita, minutes of telecommunications traffic per capita, bandwidth per capita, value of e-commerce per capita, pieces of mail per capita, and number of independent and local radio stations per capita.</p>		

major undertaking, requiring detailed and extensive before and after surveys in both the newly served areas and in control areas left without service. Such studies should be done, but with costs running into the many hundreds of thousands of dollars, they cannot be justified for every project, given that they would consume a significant percentage of total budget costs. Especially for small TA projects focused on policy reform, working through the linkages from impact on the quality and extent of reform, to impact on infrastructure provision, to impact on the performance of various sectors, and finally to impact on poverty for every project would be an excessively cumbersome evaluation exercise. Instead, a program of research to demonstrate these impacts through case studies will be combined with periodic use of detailed evaluation in selected projects. Macroeconomic indicators, income indicators, or quality of life indicators will be used in project evaluation (a) on a case-by-case basis; (b) only in large projects and where the impact is expected to be significant; and (c) only where resources have been dedicated at the outset to carry out such an evaluation. It will be important to use the results of early evaluations to further evolve the World Bank Group's work in the sector.

Further indicators, and some targets for implementation, are laid out in Annex 9. GICT will begin monitoring these indicators in FY02. At the end of this three-year strategy period, a review of ongoing experience is proposed to be conducted by OED/OEG.

Financial impact and resources

The implementation of the proposed ICT strategy has budgetary implications for projects across the entire World Bank Group. Implementation of the strategy will result in increased staff needs to support legal and regulatory reform across the II sector; developing regulatory institutions and capabilities; and systems to support universal access programs. There will also be new or expanded investment support for universal access funds, postal reform programs, ICT training initiatives, e-government programs; and IT applications in other sectors, in areas such as e-governance, e-commerce, e-health, and distance learning. In addition, it is expected that existing grant funds, the proposed "rapid response" resources, and trust funds for preparation will provide resources typically totaling between \$2 million and \$3 million per year.

World Bank Group lending for II, which averaged \$330 million per year in the 1990s, is expected to remain at about this level for the next three years. The goods and services financed with this lending budget will continue to change, as laid out in this strategy. There will be no direct lending for telecommunica-

tion rollout, and it is projected that TA support for first-stage sector reform will begin to decline. Conversely, there will be increased TA for institutional strengthening of regulatory agencies, e-commerce and e-governance readiness, the design of universal access programs, and postal and broadcast sector reform. Not included in these estimates are the full costs of support for the implementation of knowledge economy strategies, and IT investments in sector applications.

IFC investment in II for its own account is expected to be around \$400 million in FY02, and amounts of the same order in FY03 and FY04. This includes lending, equity and quasi-equity funds, as well as investments in special funds. MIGA expects to provide guarantees for II valued at between \$100 million to \$135 million annually over the next three years.

infoDev will continue to fund innovative ICT projects. Its grants are expected to total an average of \$15 million annually over the next three years. A major new funding focus of *infoDev* will be grants for e-readiness assessments. In 2001 it will provide about 20 to 30 grants, each for about \$50,000.

Implementation costs (Table 4.4) for the new strategy will primarily consist of hiring new staff, staff training, and skills development, building up research and knowledge resources, and increased monitoring and evaluation. An expanded investment financing program as outlined above, combined with an increased emphasis on learning and best-practice development, will require additional staff. Further, the monitoring of IFC Internet projects, although they are small in absolute dollars invested, is time intensive because of the early stage of investment, and an emphasis of IFC value added through management support and market knowledge. New staff will also need to be recruited to fulfill specialist roles in areas like postal, broadcast, e-commerce, and new technologies.

An annual training budget of \$360,000 for GICT will support managers and staff in remaining current with industry developments. A more detailed description and costing of proposed training programs is in Annex 8. Additionally, two staff-years are allocated to assist staff in learning from their own and colleagues' experience, and half a staff-year to support improved monitoring and evaluation of ongoing GICT projects, to ensure timely dissemination of new ideas and best practices. An annual allocation of \$90,000 will go toward developing databases directly relevant to the new strategic directions and the World Bank Group's operations in this area. This will be cosponsored by MIGA, internal trust funds, and external resources. DEC will provide a research budget of \$215,000 per year under a low case scenario, and \$770,000 per year under a high case scenario.

Expanded TA capacity to allow for “rapid response” to small requests for short-term assistance is estimated to require \$300,000 per year. These funds would support the TA linked to IFC projects or very small-scale stand-alone assistance to telecommunication regulators requested by our client countries and approved by World Bank country directors. This is warranted given the expanding unmet demand for “rapid response” TA required to support and complement the regular assistance program.

Resources must also be set aside to ensure that the ICT perspective is adequately integrated into the CAS process, and that these contributions are adequately backed up by prior ICT country assessments. Therefore, an amount of \$175,000 per year has been earmarked for this purpose. Additional costs (not estimated here) should be anticipated if the strategy’s recommendations for a broad-based ICT training program within the World Bank Group, and the better monitoring of sector-based ICT projects are followed (see Annex 8).

Retiring OP 4.50

A good practice statement on World Bank Group II operations will be updated from time to time. The recommendations in OP 4.50, the World Bank Group’s telecommunication sector policy statement of 1995, remain valid. However, the operational policy is in fact a collection of recommended good practices, instead of mandatory policy measures. The SSP proposes therefore that OP 4.50 should be retired and replaced by a good practice statement to be published by GICT. Annex 1 lays out the proposed language for this statement, which adapts OP 4.50 to the broader agenda for II laid out in this SSP. The most significant changes are:

- The scope is expanded from telecommunication to information infrastructure operations.
- The role of World Bank Group funding is explicitly expanded to include subsidy support for private provision of access to II; investment in the postal and broadcast sectors; support for the broader policy, regulatory, and educational environment for ICT; and the use of ICT in public services.

Table 4.4: Strategy Implementation: Costs per Annum for Three Years*

Budget Item	Cost Justification	Cost
Formal training Knowledge Development (website)	2.5 staff years (@150k) total for staff to spend increased time on best practice/new project development and web site development (joint resources)	360,000** 375,000
WB New expertise	2 staff years e-economy, 1 staff year media/convergence (@150k) (Bank resources)	450,000
Strategy staffing	3.3 staff years, (@150k) for monitoring, evaluation, strategy, partnerships, and business development plus 55,000 for IFC round tables (joint resources)	550,000
Enhanced small-scale TA capacity	(Rapid Response Bank resources)	300,000
Creation of II Best Practice Document	Dissemination of new Good Practice Document to replace OP 4.50 (Joint resources)	125,000**
Country strategies	ICT assessments of countries, early stage inputs and reviews into CAS (Bank resources)	175,000**
Total		2,335,000
IFC		672,500
World Bank		1,662,500
* A proposal for global public good incentive funding would support most of these activities for FY02.		
**This number is subject to PSI allocation to GICT’s earning budget. Cost per annum for two years only.		

Chapter Five: Information and Communication Technologies and Sectoral Applications

The first two strategic directions described in Chapter Three (sector reform and access) aim to create the policy environment, infrastructure, and skills required for a developing country to build up an information economy. However, the ultimate value of these efforts depends on the possibility of harnessing ICT in a wide range of economic and social applications (see Annex 4 for examples). This will require an educated and trained workforce as well as support for the development and rollout of IT across sectors—the topic of this final chapter.

Supporting ICT in education and training

A poor regulatory environment and inaccessibility of IT are not the only barriers to using ICT and developing a knowledge economy. Low education and literacy levels, lack of awareness about the capabilities of the technology, and absence of skills to develop and use ICT applications also represent significant obstacles to adoption, even when the physical and institutional infrastructure is available. The education and ICT sectors are very closely linked. Most importantly, ICT holds out the opportunity to revolutionize pedagogical methods, expand access to quality education, and improve the management of education systems.

A number of such technologies have roles as pedagogical tools, including interactive radio instruction, distance education through television, and computer-aided teaching. As part of broader education efforts, and in response to identified educational needs, ICT has found a role in many World Bank Group education projects, including the majority of World Bank distance education projects. Turkey is an example of a country and World Bank partnership to improve the delivery of education services through IT provision, based on a national policy designed to reform education, transform learning, and use ICT appropriately.

Also vital is education and training in the skills

necessary to use the tools of the new economy. A shortage of individuals trained in ICT slows down sector development and exacerbates the lag that developing countries are experiencing in joining the global knowledge economy—reducing employment, investment, and income generating opportunities. The first step here is a needs assessment to identify the new skills required, the skills gap, and the existing training mechanisms, if any, on a country-by-country basis. Once country needs have been assessed, support for education and training will be directed at two levels:

- Private sector partnerships for technical skills training of the next generation of ICT workers, including: rural telecommunication network technicians, software programmers, web developers, management of telecenters, and operation of government and community online services (through IFC projects, World Bank backed programs for IT training, and special initiatives).
- Advice and skills training for entrepreneurs and government officials seeking to develop knowledge economy applications and industries (through WBI courses and special initiatives).

Private sector partnerships for technical skills training

The private sector is generally at the forefront of all technological development, and most keenly aware of

the skills that are required to compete in the global economy. Major North American IT companies are not just addressing their domestic needs, but increasingly scaling up their training activities in the developing world as well. In India, for example, the Department of Information Technology in the state of Andhra Pradesh founded the Indian Institute of Information Technology at Hyderabad, and provided the physical facilities while drawing its core curriculum from corporations such as IBM, Oracle, Motorola, and Cisco. There are currently 400 students, with enrollment expected to reach 1,200 on campus, and an additional 10,000 students via the Internet.

There is considerable potential for the World Bank Group to leverage private sector activities in ICT training. It is well positioned to raise awareness about the skills shortage, convene interested private sector participants, and provide TA and funding where necessary to help expand and accelerate the training. The Global Information Technology/Telecommunication Technician Training Partnership is an example of the role that the World Bank Group can play in leveraging private sector initiatives. This partnership will draw together a consortium of IT/telecommunication companies to consider practical, country-based solutions to address skills development issues in the developing world. For the private sector, the benefits of collaboration are clear: standardized certification across industries; shared costs of e-learning infrastructure, content and delivery; and access to a larger pool of skilled workers. The World Bank Group benefits from the expertise and resources of the private sector, while gaining greater leverage on its education and ICT training investments, to ensure that they reach the poor and those left behind in the knowledge economy. Another example of World Bank Group support in this area is the NIIT student loan program (Box 5.1).

Training for entrepreneurs and government officials

In addition to skills training for ICT workers, there is a pronounced need to educate entrepreneurs and government officials about how to exploit ICT. Entrepreneurs and government officials in the developing world should take the lead in building knowledge economies. Their knowledge will be essential to create and maintain an environment for public sector innovation and private sector wealth creation.

- Entrepreneurs in the developing world need a wide range of advice and training to compete and succeed in the global economy. Some of the training priorities include: understanding the ICT market, raising investment capital, building an Internet business, and using technology to reinvent or enhance existing business processes.
- For government officials, the training needs surround efforts to improve the transparency, accessibility, and efficiency of the public service with new technologies. Their priorities include the acquisition of the knowledge to design IT business plans, automate administrative functions, deliver government services online, and increase citizen participation in the political process.

Workshops and seminars are appropriate mechanisms for training entrepreneurs and government officials, and here again, there is a large potential both for World Bank Group programs through the WBI (such as the Knowledge for Development learning program) and the GDLN, as well as for World Bank Group funding to leverage private sector activities. In some cases, carefully designed subsidy programs to support the private provision of training courses will maximize the development impact of investment funding.

The education departments of the World Bank and IFC, along with WBI and the special initiatives, are expected to take the lead in rolling out education and training programs with ICT components with a focus

Box 5.1: Private Sector Investment in NIIT Student Loan Program in India

IFC is helping to launch student loans in India through the creation of the first large-scale private sector student loan program amounting to \$90 million with Citibank and NIIT, one of India's largest and most reputable IT education firms.

The NIIT student loan program will be the largest in India and will help fill an urgent need, since very few Indian financial institutions currently provide such loans. The loans will be offered to IT students following the three-year NIIT curriculum—NIIT's flagship graduate course—over the coming five years. Using Citibank's consumer lending standards, the program will be based on the student's future earning capacity, thereby making loans accessible to lower-income families that could not otherwise afford tuition fees.

In the pilot program, which was launched by Citibank in January 2000, 50 percent of the students who took loans will be earning more than their parents after they graduate from NIIT, and 30 percent will be earning more than twice the income of their parents.

Box 5.2: ICT for Micro and Small Business Development

ICT has a major potential to support micro and small businesses (MSBs) development in low-income communities. MSBs' access to and use of ICT can have a profoundly positive impact on expanding customer markets and improving service, on expanding employees' skill sets, on lowering operating costs, and on increasing profitability. Yet, numerous issues prevent them from taking full advantage of ICT opportunities. The most important issues directly facing MSBs are: (a) network infrastructure access costs, (b) MSBs' lack of awareness and knowledge about the potential uses of ICT, (c) the up-front cost of a personal computer and modem, (d) lack of training for skills development on ICT, and (e) lack of easy-to-use, sector specific software and available local content.

At a broader level, the lack of a clear legal and regulatory framework also makes MSBs more vulnerable than large firms to problems linked to authentication/certification, and data security and confidentiality, especially for the firms targeting consumers through the Internet. Also, financial institutions' hesitation to take an active role in promoting e-commerce by developing smart cards or cash cards in environments where the use of credit cards is not common is an important barrier to their participation in e-commerce.

Reaching the MSB market segment will require substantial innovation across digital divide issues, beginning with the access mode of ICT infrastructure and hardware, but quickly also leading to addressing how software, local content, and MSB skills can be built in an integral fashion.

on improving the quality of teaching, and empowering learners. This will require using ICT in projects in ways that change the way in which learning is organized, delivered, and received. GICT will play a subsidiary role, and will sometimes support adult education and training components as part of a larger ICT investment.

Supporting other ICT applications

Sector-based application development and implementation will be the primary responsibility of the sectoral units in the World Bank and IFC, with support from GICT as needed. Regarding commercial applications, IFC will proceed with caution in investments in e-commerce and content. In order to succeed, Internet content and commerce companies need strong ties to the traditional economy. IFC will, therefore, undertake selected investments in firms with strong partnerships in the brick and mortar world. One example is AsiaPaperMarkets.com, a regional pulp and paper exchange. In addition, IFC will work to "e-enable" existing clients through piloting and other advisory work (Box 5.2). GICT is collaborating with industry and regional departments to this end.

IFC will also initiate investments in a range of commercial media, spanning Internet, radio, and television. Once again, Internet-only firms will be approached with caution. These investments will be selected with the development objective of improving the delivery of news, disseminating information to broaden market access and increase competition, and strengthening of local cultures and society. One example of this new approach is TV Africa, a pan-African television content provider. IFC will undertake a

small number of investments in this emerging field.

On the World Bank side, the largest, yet least monitored, investments in ICT are IT components of projects in other sectors. The latest inventory of World Bank projects with IT components identifies more than 1,000 such projects in the portfolio⁴⁷—75 percent of the total—cutting across different sectors, from health and education to public sector and financial management. Total funding for the IT component is estimated to have averaged more than \$1.0 billion per year in recent years, 84 percent for the purchase of goods, and 16 percent for technical assistance and training. Such components have included:

- Investments in sectorwide information systems for education, health, public financial management, and transportation, as well as certain generic value-added information facilities, such as electronic trade facilitation, disaster prevention and management, property and business registries, and national statistics, including hardware, off-the-shelf software, and support services.
- TA to setup of institutional management systems for project operations (e.g., for health or education projects) and financial management (e.g., for budget formulation).
- Related training in the process of developing, testing, implementing, and fine-tuning information systems.

Regarding the Internet, various sections within the World Bank are aware of the emerging importance of e-government and other Internet applications in client countries. There are already several innovative ICT projects being led across the World Bank:

- GICT is cooperating with the *PREM network* to

support the deployment of ICT in state modernization programs, as a tool for improving the internal operations of government as well as the interface between government and the general public. One project in Argentina aims to develop a one-stop Internet portal for all transactions between the government and the general public.

- The *HD network* (with periodic GICT technical support) is already using the Internet in a number of education projects, including the Turkey Basic Education project.
- There is also considerable scope for ICT application in the *PSD network*, particularly in the small and medium enterprise (SME) sector. The Latin American region, for example, is currently working on a project to use the Internet as a business development tool for SMEs in rural Guatemala.

Managing risks

However, and notwithstanding numerous “pockets” of excellence,⁴⁸ the complex nature of IT procurement as well as the design and implementation of strategic information systems increases the risk of suboptimal decisions and delayed implementation.⁴⁹ Successful systems require not just appropriate technology but that all other elements—policies, people, processes, incentives, institutions, and infrastructure—are present and work well.

Two Internal Audit Department (IAD) reviews have found that, contrary to normal World Bank Group and industry practices in the design and supervision of IT components, the World Bank does not employ institutional standards, guidelines, quality control processes, and institutionalized evaluation and tracking mechanisms. IT procurement documents are not used uniformly across the World Bank Group, and the OED does not evaluate IT as a separate element of projects. The new applications offered by the Internet suggest increasing opportunities for the use of IT components, but also increasing risks—as well as the need to consider the rethinking of some program models.

The World Bank Group’s current process for designing and implementing IT components of projects needs strengthening. Despite these components accounting for a significant percentage of costs in a range of projects, the skills base to judge their realism, efficacy, and institutional sustainability is rare among task teams and managers. This presents the institution with potentially serious risks in terms of reputation and project sustainability. As reflected in the 1998 IAD recommendations, it will be necessary to:

- maintain an overview of World Bank sectoral IT applications, which account for about \$1 billion of annual lending;

- promote experimentation with IT in sector operations supported by careful monitoring and evaluation;
- facilitate collaboration among sector units, including GICT, on specific projects with IT components;
- undertake quality control of all major IT components in World Bank Group projects;
- work toward incorporating IT into the SSPs; and
- enable cross-fertilization of IT applications and sharing of best practices across sectors and regions.

Recommendations of the last (1998) IAD report, notably the establishment of an informatics sector board, were discussed by Bank senior management but not implemented.

A team of representatives from PREM, Operational Policy and Country Services (OPCS), ISG, and GICT recently concluded that the long-term solution for these problems would involve the hiring of sector experts with considerable IT experience, as well as an active program of training and sensitization among country directors, management, task managers, task team leaders, and procurement specialists in the integration of IT in a process of institutional change management. This would create a body of staff with the needed “bridging skills”—expertise in IT issues combined with sectoral and country knowledge. This solution has significant implications for budgets and strategic staffing throughout the World Bank.

Secondments and staff exchanges with private sector firms will be arranged for simultaneously fostering professional development and diversifying the World Bank Group’s complement of ICT specialists. For example, about 20 companies have already expressed interest in training partnerships with the World Bank Group in the areas of telecommunication and IT. Staff will also be encouraged to learn from their own project experience, developing best practices and models for dissemination within the World Bank and beyond. The new World Bank website on e-government (www.worldbank.org/publicsector/egov) is a recent example of collecting and disseminating lessons from experience to task team leader.

Further, the development of social Internet applications currently lags behind commercial applications. For this reason, it would be valuable for *infoDev* to experiment with social applications incubators that could support the development of not-for-profit websites, and Internet businesses with content and services designed to improve the lives of the poor. If these are successful, there will be a role for the World Bank Group to scale up support for such projects.

In the short term, as an interim solution to the issue of IT quality assurance, three programs will be implemented:

- Framed in the context of improving risk management at the operational level, the significant complexity of IT components will be made clear to all staff involved in project preparation, along with recommendations for sources of assistance, and guidelines on thresholds for seeking such assistance, and a recommendation to seek assistance as early in the project cycle as is feasible. Because the ICT revolution may have a far-reaching impact on emerging economies, and thereby on the way many of our client governments do business, the broader strategic implications need to be considered during PRSP and CAS discussions.
- A Task Manager's Toolkit on IT components will be developed, covering issues including procurement, risk identification and management, recurring problems, and key issues of IT project management. The Toolkit will also provide recommendations to teams on when during project preparation and appraisal to seek assistance, including on the advice to borrowers contemplating substantial IT components, and sources for that assistance. The toolkit should be widely disseminated within the World Bank Group and to its clients, and made available online.
- A quality enhancement team will be formed to provide advice on IT components when required, as

judged by the managers responsible for an operation as part of the World Bank's efforts to manage risks during project preparation and supervision. It will consist of staff from ISG, OPCS, PREM, Human Development (HD), and GICT with significant experience in the use of IT in World Bank projects. The team would provide early reviews—project appraisal documents (PAD) stage—of IT components in projects. Reviews would be strongly advised for IT components whose complexity, scope, or size are such that their failure would compromise the overall development objectives of the operations.

Internal applications

Finally, ICT is not only relevant to World Bank Group clients, but also offers potential to improve the effectiveness of the World Bank Group's operations. In particular, the World Bank has begun promoting e-procurement through OCSPR, the procurements policy and services group, which is developing a strategy paper and draft guidelines for borrower use of e-procurement. By allowing widespread tendering, electronic document management, and electronic authentication and logging of all transactions, e-procurement can substantially reduce the opportunities for corruption through operational transparency.

NOTES

1. World Bank *World Development Report 1998/9*, Washington, DC.

2. This number is taken using ITU data for fixed and mobile lines per 100 people for 1990-98 and using average growth rates over that period for each to forecast 1999 and 2000 data. The two numbers are then added to provide total teledensity numbers, which have increased from an average of 0.30 to 1.47 1990-00 in low- and middle-income countries.

3. This section draws heavily on Forestier, E. J. Grace and C. Kenny, "Can Information and Telecommunication Technologies be Pro-Poor?" Paper presented at the World Bank Economist's Forum, May 3-4, 2001.

4. World Bank and Universal Postal Union (2001), *The Postal Industry in an Information Age*, Washington, DC. See also R. Schwarc et al., "E-Business and E-Government Opportunities Using the Post Office Network in India: a SWOT Analysis," Draft paper, World Bank, June 2001.

5. Canning, D., "A Database of World Infrastructure Stocks 1950-1995," mimeo, Harvard Institute for International Development, 1997. Canning, D., "Does Infrastructure Cause Economic Growth? International Evidence for Infrastructure Bottlenecks," mimeo, Harvard Institute for International Development, 1997. Canning, D. and Fay M., "The Effect of Transportation Networks on Economic Growth," Discussion Paper Series, Columbia University Department of Economics, 1993. Cohen R., *The Impact of Broadband Communication on the US Economy and on Competitiveness*, Washington DC: Economic Strategy Institute, 1992; DRI, "The Contribution of Telecommunication Infrastructure to Aggregate and Sectoral Efficiency," New York: McGraw-Hill, 1991; Analysis, *The Impact of Advanced Communications on European Growth and Trade*, Final Report of the METIER Project for the European Commission, 1995; Easterly, W. and S. Rebelo, "Fiscal Policy and Economic Growth: An Empirical Investigation," *Journal of Monetary Economics*, Vol. 32, pp. 417-458, 1993. Easterly, W. and R. Levine, "Africa's Growth Tragedy: Policies and Ethnic Divisions," *Quarterly Journal of Economics*, pp. 1203-50, 1997; Hardy, A., "The Role of the Telephone in Economic Development," *Telecommunication Policy* 4: 278-86, 1980. Madden G. and S. Savage, "CEE Telecommunication Investment and Economic Growth," *Information Economics and Policy*, Number 10, 1998; Norton, S. Transactions Costs, Telecommunication, and the Microeconomics of Macroeconomic Growth, *Economic Development and Cultural Change* 41, 1,175-96, 1992; Röller and L. Waverman: *Impact of Telecommunication Infrastructure on Economic Growth and Development*, ICCP Draft Working Paper, Paris, OECD 1994, World Bank: *World Development Report*, 1994, New York: Oxford University Press, 1994.

6. Many researchers are skeptical about the validity of cross-country econometric studies (see Kenny, C. and D.

Williams. "What Do Economists Know About Economic Growth—Or Why Don't They Know Very Much?" *World Development* Vol. 29 No.1, 2001). There are also dissenting voices on the presence of an impact in such studies. A number of studies point out that the results from many of the above studies appear to collapse once more sophisticated econometric procedures are used, and that by introducing state-level fixed effects, the returns of telecommunication are reduced dramatically (see cites in Forestier, E., J. Grace and C. Kenny, "Can Information and Telecommunication Technologies be Pro-Poor?" Paper presented at the World Bank Economist's Forum, May 3-4, 2001).

7. This becomes clear when we look at a range of estimates from just one paper, by Seth Norton of Washington University. He used two different samples and a range of statistical tests within each sample to look at the impact of increasing teledensity on economic growth. The range of estimates that the paper provides for the growth impact of increasing the number of telephones per capita from Thailand's teledensity in 1975 to 1998—from about 7 phones per 1,000 people to about 84 phones per 1,000 people—is between an increase of 0.35 to 4.43 percentage points being added to the growth rate each year. The upper estimate appears unbelievably large, and the range of estimates (again, just from one paper, and two samples) is very large as well. Why is this? All of the usual problems with cross-country regression analysis apply here: telecommunication rollout is correlated with and almost certainly caused by a number of other variables that are related to growth—such as institutional quality. Unless good measures of these variables have been put into the regression, the impact of telecommunication on growth is likely to be overestimated (of course, if they are all put in, the direct impact of telecommunication might be underestimated).

8. U.S. Department of Commerce, *The Emerging Digital Economy II*, Washington, DC., June, 1999; N. Bajpai, "Sustaining High Rates of Economic Growth in India," Center for International Development at Harvard University, Working Paper No. 65, March 2001. See also the indicators on average revenues per Internet economy worker at <http://www.internetindicators.com>.

9. Forestier, E, J. Grace and C. Kenny, "Can Information and Telecommunication Technologies be Pro-Poor?" Paper presented at the World Bank Economist's Forum, May 3-4, 2001.

10. National Association of Software and Service Companies—<http://www.nasscom.org>.

11. U.S. Department of Commerce, *The Emerging Digital Economy II*, Washington, DC., June, 1999.

12. Dasgupta, S. S. Lall, D. and D. Wheeler, "Policy Reform, Economic Growth and the Digital Divide: An Econometric Analysis," mimeo, World Bank.

13. "Innovation: How Rural Thais are Connecting to a World of Opportunity," World Bank Office, Bangkok,

Thailand, 2001.

14. Duncombe, R. and R. Heeks. 1999. "Information, ICTs and Small Enterprises: Findings from Botswana," *Development Informatics Working Paper Series*, Paper No. 7, IDPM (Institute for Development Policy and Management), June. <http://www.man.ac.uk>.

15. Forestier, E., J. Grace and C. Kenny, "Can Information and Telecommunication Technologies be Pro-Poor?" Paper presented at the World Bank Economist's Forum, May 3-4, 2001.

16. Schwabe, R., "IT and Public Sector Management in Developing Countries: Present Status and Future Prospects," *Indian Journal of Public Administration*, Vol. XLVI, No. 3, July-September, 2000.

17. Calculated by GICT staff from data and coefficients in Wallsten, S., "An Empirical Analysis of Competition, Privatization and Regulation in Africa and Latin America," mimeo, Stanford Institute for Economic Policy Research, 1999.

18. Taken from *Trends in Telecommunication Reform 1999*, ITU, Geneva. Refers to ITU member countries only.

19. A number of contributing factors for these problems existed, including: (a) the continuing (in the case of Egypt and Nicaragua dominant) role of government as the majority share holder; (although the transactions were designed to give management control to the Strategic Investor); (b) large investment obligations (in Honduras, a commitment to double the lines in five years, in Nicaragua the same in three years) and continued concern over debt (in Nicaragua, where the company owed \$120 million, of which \$50 was to be transferred to the government before privatization); (c) lack of legal and regulatory clarity (an ongoing court case over international teleports in Nicaragua, confusion over granting of international satellite licenses for private circuit use in Honduras, and delay of a telecommunication law in Egypt); (d) increasing competition from cellular to local service and from international call back and refiling to direct dial; and (e) labor conditions (in Honduras) and/or restrictive labor laws (in Egypt) that will slow efficiency improvements. Both the Egyptian and Honduran privatizations failed despite guarantees of five-year monopoly rights in basic services.

20. Broadly, a number of lessons are suggested by recent privatizations of fixed-line service: (a) as a rule, privatizations should include transfer of management control and immediate competition—exclusivity does not ensure success of fixed-line privatization, but will hinder the development of the sector; (b) new solutions should be employed to attract capital and management skills to these companies, such as capitalization of the companies (used in Bolivia), and management incentive schemes; (c) conditions regarding employment or provision of service to groups other than the poor or excluded should be minimized (experience suggests telecommunication reform increases long-term employment both in the sector and beyond); (d) as far as politically and fiscally feasible, minimum prices for bids should be abandoned, and bids judged instead on investment and rollout

commitments; and (e) a strong legal and regulatory regime will reduce uncertainty, and so attract bidders. Bolivia might provide a model here. Bolivia's telecommunication privatization plan was designed to be fiscally neutral, with companies bidding on the basis of investment plans rather than payments to the treasury.

21. For evidence of concentration of foreign direct investment flows far beyond that which can be explained by policy variables, see: De Melo, L., "Foreign Direct Investment in Developing Countries and Growth: A Selective Survey," *The Journal of Development Studies* 34, 1, 1-34, 1997; Lipsey, R., "The Location and Characteristics of U.S. Affiliates in Asia," National Bureau of Economic Research Working Paper 6876, January 1997; Overseas Development Institute, "Foreign Direct Investment Flows to Developing Countries: A Review of the Evidence," ODI Briefing Paper 1997(3) September; Kinoshita, Y. and A. Mody, "The Usefulness of Private and Public Information for Foreign Investment Decisions," World Bank Policy Research Working Paper 1733, 1996; Singh, H. and K. Jun, "Some New Evidence on Determinants of Foreign Direct Investment in Developing Countries," World Bank Policy Research Working Paper 153, 1995.

22. Source: Bloomberg. Data based on yield to maturities of selected \$-denominated bonds issued by the listed companies. Spreads were determined by subtracting yields from comparable U.S. Treasury bonds for the shown time period.

23. For rankings of sector success in implementing CDF principles, see Annex Two of the OED *Annual Review of Development Effectiveness* for 1999.

24. G-8 (2000) Okinawa Charter on Global Information Society.

25. Telecommunication work has also occurred in the implementation of multisector projects and reform measures under structural or sectoral adjustments, but the volume of investment is difficult to quantify because of the cross-sectoral or budget support nature of these initiatives.

26. *The Bank Group's Experience in Information Infrastructure—A Joint OED/OEG Review* (CODE2000-36), World Bank, May 2000.

27. *The Bank Group's Experience in Information Infrastructure—A Joint OED/OEG Review* (CODE2000-36), May 2000, and *Management Response to the OED/OEG Review* (CODE2000-47).

28. *Trends in Telecommunication Reform 1999*, ITU, Geneva. Refers to ITU member countries only.

29. The 88 countries are those that had private operators according to the ITU's *Trends in Telecommunication Reform, 1999*. The 63 countries assisted in the reform process include 38 identified from OED's list of telecommunication projects in the portfolio and 25 additional countries identified by GICT task managers as countries that the department has assisted through non-lending support (non-lending assistance includes PPIAF, infoDev and IFC technical assistance). The two numbers are not completely comparable—the World Bank has been involved in liberalization support for countries with

private providers (for example, the OECS), and has provided liberalization support for countries still to undergo full privatization, or which have privatized since 1999 (for example, Morocco).

30. Based on the assumption that, on average, a fifth of multisector TA loans is assigned to telecommunication activities. This assumption had to be used in the absence of a detailed inventory of the Bank funds assigned to the telecommunication components of these loans.

31. Wellenius B., *Telecoms Reform—How to Succeed*, Viewpoint Note No. 130, Finance, Private Sector and Infrastructure Network, The World Bank Group, 1997.

32. “Poor” households are those in the bottom 20 percent of income distribution.

33. OSIPTEL (Peru) and World Bank project data.

34. When projects with combined fixed and mobile investments are taken into account, the total volume of lending to the cellular sector rises to \$298 million, or 32 percent of the total ICT portfolio.

35. Project cost divided by net IFC investment commitments.

36. Africa is not yet included, since the bulk of African cellular investments occurred in the late 1990s for which little empirical data is yet available.

37. A snapshot after five years yields between 22 and 30, though less data is yet available since the bulk of IFC’s cellular investments were made in the late 1990s.

38. Taking the same snapshot after five years, these numbers range between 40 to 60 new lines per \$1,000 IFC investment, underscoring the impact that this quickly deployable technology can have.

39. Namely, Azerbaijan, Brazil, Colombia, Indonesia, Kazakhstan, Pakistan, the Slovak Republic, and Tanzania.

40. PPIAF Annual Report 2000.

41. World Bank, WDI, and www.rfd.freeuk.com.

42. www.comminit.com/interviews_archives5.html.

43. Kenny, C., “Is The Internet a Useful Tool for

Poverty Relief?” mimeo, World Bank, GICT Department, 2000.

44. Argentina, Benin, Republic of Congo, Egypt, Gabon, Guatemala, Honduras, India, Indonesia, Jordan, Kenya, Malawi, Mauritania, OECS, Sri Lanka, Togo, Trinidad & Tobago, Yemen, Zimbabwe.

45. See the Rural Funds Update on the company’s website: www.inteleconresearch.com.

46. As noted, “Information and communication technologies are a *sine qua non* for successful knowledge economies. These lower the cost of information dissemination, and provide new means of collaboration and connection among various producers and users of knowledge. Effective use of ICT is helping to overcome traditional barriers to collaboration, and is no doubt responsible for the increasing trend toward international collaboration in research.” (World Bank: *Science and Technology Strategy Concept Paper*, Washington DC: World Bank, 2001).

47. Included in the Environmentally and Socially Sustainable Development (ESSD) Vice Presidency’s project database.

48. Presently the availability of expertise is very uneven across the regions. For example, the Europe and Central Asia (ECA) region has a well-consolidated team of some four or five IT specialists located in PREM, which provides support to all sector units in the region. At the other extreme, the Latin American and Caribbean (LAC) region does not retain any IT specialists at all, and South Asia Region (SAR) has recently redirected staff working on project IT components to internal IT support.

49 See World Bank Group, *IAD Report On An Audit of Informatics in Bank’s Lending Operations*, Report No. FY96-46, April 12, 1996 and *IAD Report on a Follow-up Review of Informatics*, Report No. FY99-40, December 8, 1998.

ANNEX I

GOOD PRACTICE STATEMENT ON INFORMATION INFRASTRUCTURE

This good practice statement provides general guidance to World Bank Group staff and clients with respect to World Bank Group operations supporting the development of II. In view of the fast evolving nature of this sector, this guidance will be updated from time to time. It summarizes the main operational implications of the ICT Sector Strategy, approved by the World Bank's Board of Directors on September 6, 2001. It draws also on the former OP 4.50 (Telecommunications Sector) of May 1995, which has been retired, and on *The Bank Group's Experience in Information Infrastructure: A Joint OED/OEG Review* (May 2000). Unlike OP 4.50, this statement also covers: (a) IFC and MIGA, in addition to the World Bank; and (b) II beyond telecommunications.

For the purposes of this statement, information infrastructure refers to the networks through which information (voice, as well as data or multimedia) travels; it includes telecommunications, the Internet, broadcasting, and other information networks. Other segments of the ICT sector, in particular information technologies and their multiple applications (including e-government and e-commerce), are not directly addressed by this statement. Postal networks are also part of II; they provide a range of services from basic communications and financial services to the delivery mechanism for e-commerce. In many countries, postal systems are among the few public services accessible to the poor.

Importance of II

Strong, widespread, and efficient II networks are the underpinning of any knowledge economy and play an important role in economic development and poverty reduction. To name only a few of its contributions to national welfare:

- II is essential to growth, and necessary for the development of a country's productive capacity in all sectors of the economy.
- It links a country to the global economy, and ensures competitiveness.
- It contributes to poverty reduction by increasing productivity and providing new opportunities.
- It is a vehicle for the efficient delivery of public administration, social, and other public services,

and is important for transparency and good governance.

The World Bank Group supports efforts of developing countries to accelerate II sector growth, introduce new services, improve performance, and extend services to more people. The form of these efforts may vary with the diversity in the borrowing countries' economic structures and levels of development.

Role of the World Bank Group

Each institution within the World Bank Group has a specific role to play in achieving these objectives. The World Bank focuses largely on providing support to governments in the development of a procompetitive policy and regulatory environment for the sector, and in extending the boundaries of service provision. The World Bank uses a range of instruments (primarily loans/credits, grants, learning and analytical work) to, among others:

- contribute to national ICT strategies and their implementation;
- support policy reform, including competition and private participation;
- strengthen the capacity of regulatory institutions;
- finance, on a limited basis, subsidies leveraging private investment to extend access to ICT services; and promote the use of ICT in the provision of public services, including health and education.

IFC supports private II investment (through equity, quasi-equity, loans, guarantees, risk management products, and other instruments), while MIGA provides guarantees to private investors covering specific economic and political events. IFC and MIGA support is especially important to accompany the transition from monopolistic public sector markets to competitive private sector-led II markets.

The World Bank, IFC and MIGA work together to formulate joint assistance packages, making flexible and innovative use of their broad range of instruments to help member countries develop II and bridge the digital divide. They also coordinate their II assistance with that of other multilateral and bilateral development institutions. They are careful to avoid situations of conflict between their respective interests, and supporting sector reform programs that are

not compatible with a country's international commitments, in particular in the context of WTO.

Competition and private sector participation

The World Bank provides assistance to client countries in developing and implementing II strategies, including the establishment of a sound legal and regulatory environment, as well as capacity building.

Competition and private sector investment are a cornerstone of successful II strategies worldwide, and have fueled the fast growth of II over the last two decades. Evidence suggests that private, competitive provision under an effective regulatory regime provides better, cheaper service to more people than other regimes.

The World Bank Group promotes increased competition and private participation in the II sector by supporting the entry of new service providers, privatization of state enterprises, and more generally, by creating conditions that attract direct, private investment, and facilitate access to domestic and foreign capital markets.

The World Bank Group supports the privatization of incumbent operators, mostly through advice and assistance in planning and implementing the process. When a state enterprise has been earmarked for privatization, significant new investment by the state or the incumbent prior to privatization is usually discouraged, as new owners will generally be better equipped to make major investment decisions.¹

The specific objectives and constraints of privatization programs vary widely. For many governments, privatization (or license) proceeds are an important source of fiscal revenue. Governments should, however, not underestimate the considerable direct and indirect revenues generated by increased competition in the sector. The fiscal benefits of increased competition will indeed normally exceed the possible loss of revenue that may result from the absence of protection or exclusivity granted at privatization.

Regulatory environment

There is no single model of regulation that can be applied to all II segments in all countries. Regulatory design depends in part on the degree of current and possible competition in the market, and on political and legal traditions, among other factors. There are, however, some basic and common principles. One of them is the effective separation of policy and regulatory functions: regulators should be independent from the operators they will regulate. The World Bank also encourages the autonomy of regulators *vis-à-vis* government and policymakers. Financial autonomy implies resources independent from the vagaries of the

budget process, typically through levies on operators. Operational autonomy implies protection from political interference, rules governing conflicts of interest, as well as measures to ensure that the regulatory agency is able to attract and retain staff with the requisite expertise.

Regulatory entities typically have a significant role in the areas of licensing, numbering, interconnection and access (ensuring fair competition), protection of consumers, monitoring of operators, and settlement of disputes, to name just a few. Where markets are not yet competitive, regulators may also have an important tariff or price control function. The World Bank Group supports the establishment and enforcement of clear, stable, and transparent regulatory rules and procedures, and encourages openness and public consultation.

Telecommunications regulators are often also entrusted with commercial frequency allocation and management, as well as regulation of broadcast transmission and, in some instances, postal services. This broader scope, as well as the use of technology-neutral regulation, greatly facilitate the synergies between converging II segments and services.

The World Bank Group supports regulatory capacity building through policy advice, training, technical assistance, and other means.

Access

The market alone may, however, not be able to meet all socially and economically desirable access objectives. The Bank is increasingly involved in advising governments on extending ICT services beyond the market. Services that are deemed necessary for social, development or security reasons, but that are unprofitable even under liberal entry and pricing policies, can be provided to low-income (including rural) population groups through communal facilities (such as telecenters) and/or rendered viable through limited, targeted subsidies.²

Community involvement provides one of the avenues for reaching poor or excluded customers. Communities are increasingly involved in the design of public access programs (through surveys and participatory design techniques), as well as in the monitoring of such programs, and in some instances, even in the provision of public access through local nonprofit organizations.

The World Bank Group also supports increasing involvement of the traditional (for-profit) private sector in the delivery of access services to excluded groups or communities. The main channel for such schemes, which are sometimes referred to as output-based aid, is the award of licenses for service delivery (which could

include telecommunications, Internet, broadcasting, or postal services) to the bidder asking for the lowest subsidy. These tenders have proven to be a cost effective way to provide coverage beyond the market. The successful roll out of such schemes would normally require that the market has already been effectively liberalized and that no operators have offered to provide the services on commercial terms.

Investment in II

Large amounts of investment will continue to be needed to accelerate and sustain II development. The private sector has shown its ability and effectiveness in mobilizing resources and expertise in this area. The World Bank Group, therefore, usually advises against the use of scarce public funds for investment in this sector.

World Bank Group financing may be used as catalyst and comfort for private investment in the sector. World Bank Group institutions may finance direct investments in the II sector in countries where an appropriate policy and regulatory framework is in place, or where the country is committed to or in the process of developing such a framework. The bulk of such financing will continue to be provided by IFC and MIGA to private companies.

IFC supports the development of private II by focusing its efforts on three areas: access infrastructure; software, and IT products and services; and content and e-commerce. The core of IFC's II strategy is to promote competition and extend telecommunications access by facilitating the roll out of cost-effective connectivity in client countries. This is accomplished through IFC's mobilization of capital for private sector-led projects utilizing various technologies such as fixed, wireless, satellite, cable, and fiber optics. Similarly, IFC encourages the development of knowledge economies through its support of IT (software applications, enabling platforms, consulting services, etc.) and related applications, broadcasting, content, and e-commerce. IFC aims to complement, rather than displace, private flows of capital to private sector projects with high development impact, where IFC's participation plays a critical role in catalyzing projects, mobilizing additional sources of funding, promoting foreign direct investment and transfer of technology/knowhow, as well as enhancing the competitiveness

and overall performance of the sector.

Financial support to public sector entities for II investments should remain the exception and be limited to the following main situations:

- where a preprivatization IFC loan may facilitate and accelerate a privatization process, in particular by assisting an incumbent state-owned operator in restructuring its operations to cope with increased competition; and
- in the postal sector, where World Bank Group support to open the sector to competition may be accompanied by transitional support to the incumbent postal operator, including, where relevant, to fund the cost of redundancies.³

World Bank Group financial support to public sector entities should be tied to a clear, time-bound reform program and sustainable strategy to open the sector to private participation and competition, including specific benchmarks to assess progress in reform. Support may include, for example:

- transforming the operator into a corporation governed by company law (corporatization);
- rebalancing tariffs to phase out cross-subsidies;
- refocusing on core business;
- removing barriers to entry and to competition;
- making equitable arrangements to interconnect new entrants;
- providing assistance for the transfer of ownership control to the private sector;
- and ensuring effective regulation of the sector by an empowered regulator.

Increased scrutiny is required of II investments in public entities outside the ICT sector, such as power or water utilities and railways. Private networks (i.e., for the sole use of the public entity) should not be dealt with differently from other investments in such public entities. In view of the great interest of alternative telecommunications networks, in particular for the rapid and cost-effective deployment of new private service providers, the case for World Bank funding of public or shared infrastructure would need to be made on the basis that: the private sector has been given the opportunity but is not interested in investing in such projects; and the provision of telecommunications services to third parties would be done on a level playing field, without cross-subsidies, tax advantages, preferred procurement, or other privileges.

This statement and future updates thereof can be found at <http://www.worldbank.org/ict/>.

Comments or questions on this statement may be addressed to the Global Information and Communication Technologies Department through the link provided on the website.

ANNEX 2

FRAMEWORK FOR NATIONAL INFORMATION AND COMMUNICATION TECHNOLOGIES STRATEGIES

This Annex identifies and discusses actions needed in the key dimensions of national ICT strategies—those sectors and areas crucial to the knowledge economy. It accords special emphasis to the role governments play in each of these areas. The focus is on those areas where governments have a direct role, or a policy and promotional role, to support private and civil society initiatives. This does not imply that a government will undertake a controlled planning process to create an information society. Rather, in most instances, it will create the necessary institutional and policy preconditions for the private sector to invest in the development of the knowledge economy.

Creating an information society can be supply-driven only to a limited extent. Eventually investment—in infrastructure, in technology, and in services—will depend on market demand characteristics. Strategies for “creating” an information society cannot be analogous to large-scale development projects and planning that characterized many developing countries’ transition to industrial societies, because altered global realities have left governments with fewer resources and capacities. Inasmuch as governments can adopt a strategy, its main principles must be to remove the policy and institutional barriers that prevent the private sector from responding to market demands, and to some extent, to create markets by encouraging the adoption of technology.

The strategy, while outlining the different areas of emphasis for a given country, and the respective roles of the public and private sectors, will focus on government actions. This is partly because private sector actions cannot be dictated by strategy, but will follow the imperatives of the market. The six crucial areas where governments need to take action are:

- general competition policy and legal framework;
- access infrastructure—policy, legal and regulatory framework for telecommunication, broadcast, and postal;
- e-commerce, content, and convergence legislation;
- industrial policy for the IT industry;
- promoting ICT applications in the government, private, and social sectors; and
- human resources skills base.

These six areas form a basic framework within which

governments must implement detailed policies, actions, and initiatives. This framework can be applicable across countries, and there is sufficient room to tailor it to the specific needs of individual countries.

Access infrastructure—policy and regulation

A robust, well-functioning, and competitive telecom infrastructure is key to efforts to develop the ICT sector. Efforts to make a transition to a knowledge-based economy will be largely unsuccessful without access to telecom infrastructure facilitated by market-based mechanisms. Creating a strategy in this sphere is difficult, because direct government provision of infrastructure has become unsustainable. But governments do have a significant responsibility to promote appropriate policies. Moreover, official institutions will continue to play an important role in providing independent regulation of the affected sectors. A comprehensive sector reform process includes the following key elements:

- *Independent regulatory agencies:* One of the most difficult issues countries have historically faced has been the establishment of an appropriate functional and institutional approach to ensure the independent exercise of regulatory functions applicable in the sectors. Institutional reform and delineating the respective roles and functions of the various stakeholders in the sectors are critical to credible and sustainable regulatory reform.
- *Procompetitive policies:* In an age characterized by blurred distinctions among the technologies by which a variety of services are provided, and in which traditional notions of “natural monopoly” have been largely proved erroneous, close attention must be paid to the role, if any, of granting exclusive rights. Indeed, international experience has shown that where market entry is unimpeded, efficiencies increase. Accordingly, preference is given to competition, but where resources are scarce or for other compelling public policy interests, restrictions on entry can be justified. Moreover, due to the phenomenon of convergence, competition policies and legal frameworks responsive to a dynamic sector have become increasingly necessary to ensure certainty for both investors and users.

- *Licensing*: Rules for licensing new entrants are important to ensure parity in market entry and the viability of operation. While careful selection criteria are important to ensure that accredited, financially sustainable operators are granted licenses, aggrandizement in the form of very high license fees will prove ruinous to private investment and sector development prospects. The selection criteria must be based on the actual merits of different proposals in terms of value added to long-term sector development.
- *Interconnection*: Clear, transparent interconnection rules enable new entrants to (a) reach customers connected only to incumbent, dominant operators and (b) choose between developing their own infrastructures or using those of others, priced to reflect costs. The principle of nondiscrimination will ensure that dominant incumbents do not subsidize their affiliates by offering interconnection on terms more favorable than to other operators.
- *Tariff rebalancing*: Procompetitive tariffs perform a central role in the functioning of the telecommunication sector and the economy. Tariffs that are out of line with costs result in wrong decisions on investment and use, distorted market development, and economic inefficiency. Cross-subsidies among services or companies are on these grounds undesirable. Tariffs that do not allow for cost recovery even under efficient management are a significant impediment to the prospects of successful privatization.
- *Spectrum regulation*: Clear, fair, and transparent rules for the allocation and assignment of scarce spectrum resources, and regulating new entrants through appropriate licensing mechanisms are important for the development and responsiveness of the wireless segment of the market to fast-changing technologies, applications, and global demand for bandwidth. Spectrum becomes more valuable with convergence, but attempts (such as those in Europe) to maximize the government's share of that value through auctions may limit the speed with which services are expanded, create high entry barriers only large multinationals can overcome, and limit the extent to which spectrum may be allocated to lower-revenue generating services or poor segments of society.
- *Universal access*: Even putting a procompetitive regulatory regime in place might not ensure the development of the telecom infrastructure sector. Private investment is always constrained by demand, and providing telecom services to the large percentage of residential and rural subscribers is not usually commercially viable in developing countries.

Therefore governments need to devise a variety of mechanisms to promote universal access.

- *Privatization*: Incumbent public monopolies, often with government departmental status, have proven inept at expanding the telecom network and initiating or adapting technological innovation. Therefore, privatizing the existing monopoly to infuse a market-oriented incentive structure is seen as a fundamental tenet of the reform process.

E-commerce and convergence: legal framework

Promoting e-commerce and other applications of new technologies is the linchpin of the new economy. Global communication networks increase the country's trade prospects, open new markets, and promote development by enabling leading primary, industrial, and services sectors, as well as small scale enterprises to trade with larger markets. Transactions over the Internet, however, open up a host of difficult legal issues. Assuming that under the basic access provisions there are already in place adequate *telecommunication* legal frameworks, *competition law* of general application, and laws regarding *licensing* and use of *frequency* (if separate from the telecom law) and *broadcasting* will also feed into the legislative portion to bridge the digital divide. Some of the other key legal issues that need to be addressed in order to create a viable business environment on the Internet relate to the following areas:

- *Digital contract and signatures*: Recognition and enforceability of electronic contracts, provisions to ensure that digital signatures can be authenticated and are legally binding, and retention of electronic data.⁴
- *Security, public/private key infrastructure*: Development of an information security architecture, certification processes, and regulations thereof to ensure confidentiality and security of electronic transactions and financial data, including National Certificate Authorities.
- *Encryption*: Ensuring that necessary technologies (including the underlying software) are permitted to be imported and deployed, to provide the security and certainty that electronic commerce users will require to confidently conduct electronic commerce.
- *Personal data privacy protection*: Legal provisions for protecting the privacy of personal data.
- *Banking/financial services*: Ensuring that electronic payments systems are permitted and have key functionality for the security and certainty necessary for electronic payments transactions.

- *Exchange controls*: Ensure that exchange controls do not impair the development of e-commerce.
- *Copyright and intellectual property rights*: World-class protection of intellectual property rights, which exist (sometimes exclusively) in electronic form.⁵
- *Liability*: Limitations on liability of ISPs and network operators for content of users.
- *Electronic payments*: Taxes, and tariffs on electronic transactions.
- *Duties and import tariffs*: Reduction of import barriers to high-tech hardware and software necessary for e-commerce to flourish.
- *Computer crimes and electronic fraud*: Regulations covering computer break-ins, launch of viruses, theft of credit card codes, theft or destruction of information, and electronic impersonation of a professional, business, or government official.
- *Telemedicine*: Limitations of liability, health insurance adaptation, validation of credentials, rural access.
- *Consumer rights*: Provisions to protect the rights of consumers of multimedia, especially in disputes with content providers and e-merchants whose products or services may not be physically tangible.
- Others as required by local circumstances.

Promoting IT and IT-enabled industries

In addition to telecommunication networks, strategic information systems and IT hardware and software are the other key components of a country's IT. Some countries have created a global competitive edge for their IT, especially in the software sector, with a series of measures across different areas, including providing infrastructure and investing in technical education. While most developing countries will not necessarily be able to compete in the cutting edge of the global IT sector, they need to develop their domestic IT sectors regardless. A robust domestic IT industry is important for sustainability in an information economy, and for reducing the dependence of the country on outsourced technology. Efforts in this area need to focus on attracting foreign investment as a source of much-needed capital, to diffuse technological innovation and learning, and also to support the domestic entrepreneurial base. The main areas that government need to focus on when trying to develop their local IT industry are:

- *Investment policies*: rules governing foreign direct investment in the IT sectors, the conditionalities tied to allowing foreign investment, etc.
- *Taxation*: Tax incentives are the traditional means of promoting an industry that has the potential to generate growth for the entire economy, as well as to attract foreign investment. Providing tax

incentives through exemption from partial or specific tax liabilities has proved a powerful incentive to bring more investment; however, the trade-offs involved in terms of losses of revenue to the industry measured against actual investment inflow and profit reinvestment need to be carefully assessed.

- *Approval procedures*: Easing up and speeding up bureaucratic procedures and clearance mechanisms are key to supporting and promoting investment.
- *Establishing high-technology parks*: There is considerable debate regarding the value of establishing concentrated high technology cluster areas versus a more diffuse development of the IT sector. Governments need to assess carefully the pros and cons of the different models, the appropriateness of each model to country conditions, and the government's role in creating technology parks.
- *Identifying leading sectors*: Since all countries cannot gain competitive advantage in the cutting edge global IT industry, leveraging information technology to increase the efficiency and value-added of competitive sectors, and expand their market reach would be an attractive strategy. Government could take various initiatives to promote the diffusion of IT in these industries and sectors. The promotional role of the government in both the IT industries and IT-enabled industries will require a strategy that raises awareness, and provides incentives.

E-governance

Governments can promote the widespread diffusion of ICT applications and promote the idea of a knowledge economy only if their own operations are streamlined and technology-enabled. Therefore, they should assign top priority to making the governance structure technology-compatible; and should do so by introducing a series of measures to streamline procedures and operations at different levels of the bureaucratic maze. The key elements of implementing e-governance will be:

- Developing a web presence by building a single government portal that is customer oriented, crosses ministerial and agency boundaries, and is e-commerce enabled with links to all other public government websites.
- Setting up local content production in key ministries that can be used by the public, businesses, the government and potential investors. Processes should also be established to ensure that content is regularly updated and new content is created.
- Identifying the most burdensome processes, and streamlining and reducing duplication where practical.

- Redirecting government IT spending to focus on computerizing and web-enabling key processes and encouraging redirection of IT spending with seed funds to additional equipment and networks for civil servants who are active in the redesigned processes.
- Building capacity within the government by undertaking training for civil servants to facilitate e-government and to develop computer based training packages for government employees.

Human resources and capacity building

Education is another key area where governments need to adopt a proactive and concerted strategy both for providing the technical labor necessary for a robust IT industry, as well as for creating the capacities for the adoption, use, and diffusion of the technology. Governments need to take action especially in the following areas:

- *Promoting access to ICTs in primary and secondary schools:* The use of technology at the primary and secondary levels is a necessary foundation for a technologically-literate population. The government can ensure that IT is part of primary and secondary school curriculum, and make resources available for diffusion. The private sector would also potentially be a willing participant in this as a means of creating potential future markets for technology.
- *Promoting technical IT skills:* Depending on the structure of higher education in different countries, governments can promote technical skills—programming, engineering etc.—in the labor force as an input to the IT industry. Government investment in this must yield benefits to the local

economy, and hence measures to combat the brain drain have to be integral to public funding for technical education.

- *Promoting ICT use skills in the general population:* Special technical training schools and institutes might also be required to offer a more basic level of education to the general adult population in the use of the new technologies to ensure their widespread diffusion.

Organizational and implementation issues

Given the broad-based and cross-sectoral nature of the conditions necessary for instituting an ICT economy, different governmental organizations and agencies will be involved in adopting these measures—ministries of telecommunication, electronics, trade and commerce, education, and others. Most countries have instituted coordinating mechanisms such as task forces, interministerial councils, and working groups to ensure that different organizations work in tandem. The relative merits of these mechanisms rather than setting up a separate ministry would need to be assessed.

Setting up a separate ministry might even prove harmful if bureaucratic oversight is extended to areas in which entrepreneurial autonomy is more valuable. At the same time, proliferating organizations such as coordinating bodies and committees should be undertaken only with a clear and specific mandate that will add value to the development of the IT. Separate organizational structures that oversee different components of the national ICT strategy, with a coordinating mechanism for information sharing, and providing overall guidance, might be more useful.

ANNEX 3

OPTIONS FOR UNIVERSAL ACCESS AND RURAL TELECOMMUNICATION DEVELOPMENT

Slow growth and high costs have made extending access to rural areas a particularly difficult issue, reflected in high urban-rural disparities in telecom penetration. Recent technological advances, rapid cost reductions, as well as market innovations, however, have created opportunities for increasing access to ICTs for remote and poor areas. Lower-cost equipment, wireless systems, new methods for retailing, and the concept of community points of access, have all made communications more accessible. At the same time, regulatory frameworks are being structured to offer incentives, and impose requirements, to extend service coverage to high-cost and peripheral areas. The sections below discuss the issues involved in a strategy to extend rural access, such as community access through rural telecenters, regulatory incentives to extend access, and the creation of universal access funds to subsidize rural network expansion. The chapter will also discuss the example of Chile, which has had considerable success in extending rural access through a reverse-auction bidding mechanism.

Community access

In addition to low income levels in rural areas, line installation costs can be so high that private lines are financially nonviable. From the operator's point of view, public ICT access points provide higher revenues compared to residential lines and, when strategically situated, can be commercially viable.

Community access points can take different forms, depending primarily on the kind of technology deployed, and services provided. At the very basic level is the simple payphone. Phone shops are usually physically manned, and in addition to the basic phone service may also provide fax and even computer facilities. Multipurpose community telecenters (MCTs) are more sophisticated and provide a range of communication services. MCTs typically are equipped with a combination of services such as telephony, fax, e-mail and the Internet (via dial-up or ISDN); office equipment such as computers, modems, CD-ROM, printers and photocopiers; and media services, including radio, TV, audio and video devices, and multimedia hardware and software.

While "cyber cafés" are usually purely commercial

businesses in cities and along main roads, the concept of public-private partnerships to design and fund community telecenters has emerged as a quick and attractive means of making tools of the information society widely available. MCTs can be commercial, not-for-profit, or hybrid operations. They can extend the reach of basic services such as education, health, and skills training. They can transfer agricultural and other expertise, and give local producers access to information on the market, thus reducing the need for intermediaries and increasing rural incomes. In some cases, such centers cooperate with postal services to exploit e-mail in connection with mail delivery services, and can provide access to infrastructure for the development of business (virtual offices, banking, e-commerce, customer care). In designing rural telecenter projects, three principles should be emphasized:

- a bottom-up approach, in which small businesses such as phone and office service shops are encouraged to develop an ICT component in response to market opportunities, perhaps with the inducement of microloans for computers and Internet access;
- business-community partnerships, with donor or NGO assistance, to complement rather than compete with successful small phone shop and telecenter businesses;⁶ and
- policy initiatives to encourage both the rollout of affordable and suitable quality Internet service outside the main urban centers, and the permission and licensing of the use of appropriate technologies such as wireless, or very small aperture terminals (VSATs) by access providers.

Regulatory interventions

Regulatory interventions are also important in efforts to close the access gap. Specific mechanisms can be used by regulators to bridge the access gap such as service requirements and incentives for operators, and creating subsidy mechanisms to attract investments. Access requirements can be presented in the form of rollout targets for private lines, teledensity targets, targets for public facilities such as payphones or phone shops, or minimum time to fulfill requests for a mainline. In addition to the number of lines or payphones

installed, delivery time and areas to be covered may be specified. In many cases, rural service requirements are specified as targeting service to all villages or regional centers of a certain size, e.g., villages with more than 500 inhabitants.

By setting targets for mobile operators, and ideally allowing them to also provide fixed wireless service, rural access can be accelerated, since mobile networks can be installed more rapidly than fixed lines, and are less vulnerable to vandalism and theft. Access is also better improved by awarding licenses based on build-out plans as well as license payments.

There are a number of techniques to further support rapid rollout of services. Packaging lucrative areas with less profitable ones within a same license area, is one way to ensure balanced network expansion between regions. Also, allowing bidders to tender for several adjacent territories, or as many areas as they want, increases the possibility that all the regions are tendered. Multiple services may also be bundled under one license, and mobile licenses for rural areas could be made more lucrative by allowing operators to provide international service.

Promoting universal access to ICT

Even with these incentives, private expansion of telecommunication service to rural areas might not be commercially viable, and a range of special financing mechanisms and investment subsidy schemes has been devised. In a competitive environment, where other operators in addition to the incumbent share the universal access responsibility, the costs of provision of universal access can be financed through special funds. Universal access funds award subsidies to operators, usually in a competitive manner, to make access provision financially viable. The fund can be administered by the national regulator or by an independent body. Sources for such a fund can vary: for example, a government budget allocation, license or radio frequency fees, an operator revenue contribution, seed finance by a development bank or agency, interconnection levies, or virtual fund transfers. The most frequently used fund collection mechanism is to impose a levy on telecommunication operators, usually a certain percentage of their annual revenues. This generally varies between 1 and 2 percent. The operators imposed with the levy are usually basic service providers, but sometimes include mobile operators.

The introduction of competition through a bidding process for the use of universal access funds encourages operators to look for the best technology and other cost-savings practices, often minimizing the subsidies, if they are required at all. New entrants and sometimes existing operators compete for subsidies for

network build-out in unprofitable areas, with the subsidy being awarded to the operator with the lowest required subsidy or the highest service rollout commitment, or a combination of both.

An alternative financing method is special low interest loans to encourage operators' network build-out in the most challenging regions, provided by governments or bilateral and multilateral aid agencies. Rural service providers face large up-front costs for infrastructure rollout, and thus institutional loans to help finance initial capital investment costs would be useful, especially where domestic capital markets are weak.

Chile—pioneering telecommunication expansion to rural areas

Privatization of telecommunication in Chile in 1988 has proved to be a success: with fast growth, new services, technological innovation, high productivity, and prices that are among the world's lowest. By 2000, the number of fixed and mobile phone connections had multiplied tenfold from their 1988 level, and more than 70 percent households today have a telephone.⁷

This rapid rollout and increase in access were largely due to the introduction of a competitive market. But, for the 15 percent of households with no access in 1994, the Chilean government created an access fund.

To increase access to public telephones in rural and low-income areas, the government created a special fund within the national budget, administered by a council chaired by the telecommunication minister. Requests for payphones were collected annually from regional and local authorities, neighborhood associations, and the general public. Projects, each typically comprising 20 to 50 localities forecast to have a positive social net present value (NPV), but unlikely to be commercially viable on their own, were ranked by social NPV per unit of subsidy needed to make them viable. The highest ranking projects were chosen to receive subsidies.

Bids were invited, and projects were awarded to bidders requiring the lowest onetime subsidy. A winning bidder was granted a nonexclusive operating license, and any necessary radio licenses within 60 days, to provide at least one payphone in each locality for 10 years available to the public 24 hours a day. Bids could propose additional services (such as individual business or residential telephone lines), and these were included in the licenses, but not taken into account in bid evaluation. Access charges and payphone call charges remained regulated. Licensees were free to select the technology, network structure, and payphone location within each locality, subject only to rules that are applicable to all telecommunication operators.

From 1995 to 2000, the fund undertook seven rounds of licensing. Sixty-one hundred rural localities with about 2.2 million inhabitants were provided with payphones and about 24,000 individual telephone lines. Total investment reached \$160 million, of which about \$50 million went into installing payphones supported by \$21 million in subsidies. For every dollar of subsidy, the private operating companies thus invested an average of seven dollars of their own money.

The average subsidy of \$3,400 per payphone fell far below \$10,000 to \$20,000 paid by the government earlier under similar programs for rural areas. The saving was achieved by paying the companies only for the expected losses from these phones, rather than the full investment cost, using competition among operators to determine how much subsidy was really needed.

Reaching the first half of the targeted rural population (about one million people) cost the fund only \$3 per person or \$1,200 per locality. The cost increased as the program reached out to smaller communities in

less accessible locations, and as companies initially competing for market positions became more concerned about commercial sustainability. The last round of licensing, which benefited only 2 percent of the initial targeted population (about 40,000 people), cost \$45 in subsidy per inhabitant, or \$10,000 per location.

Including payphones to be installed in 2002, the fund extended payphones to virtually all Chileans. The total cost to the government was less than 0.5 percent of total telecommunication turnover during the five years of the program. Administration of the fund cost less than three percent of the subsidies granted. Responsibility for the remaining one percent (some 150,000 inhabitants countrywide, mostly in clusters of less than 60 people) has been passed on to the regional authorities, who are better equipped than a central program to deal with the needs of scattered populations in conjunction with other development initiatives.

ANNEX 4

PUTTING INFORMATION AND COMMUNICATION TECHNOLOGIES TO WORK IN OTHER SECTORS

The World Bank has significant informatics components in most of its projects, comprised mostly of strategic information systems for financial management, tax, customs, accounting, personnel management, and other processes, as well as establishing IT classrooms in the education sector. Limiting project-related interventions to stand-alone IT solutions is inadequate to meet the demands of the new economy. New technologies, especially Internet-based information and service delivery, offer immense possibilities to meet a range of sectoral objectives, and IT components need to be upgraded to reflect the realities of a new economy. If appropriately deployed, ICT can help facilitate crucial economic and social development objectives in all sectors:

- Efficiency gains: ICT reduces the unit cost of information by increasing the speed with which it can be collected, maintained, and disseminated.
- Linking to the global economy: ICT applications enable even very small-scale operations to link to global markets, groups, and organizations.
- Bridging information gaps: The rapidly decreasing cost of technology makes access more widespread. At the same time, the nonproprietary nature of the Internet makes more information available to everybody.
- Empowerment: Because it makes information freely available to all, ICT is potentially empowering and democratizing.
- Transparency/ accountability: The speedier information flow and its public availability combine to create greater transparency and accountability in the functioning of organizations.
- Extending the reach of services: New ICT applications, especially using mobile technology, can deliver services to remote, otherwise unreachable locations.

Moving towards the networking of projects implies greater emphasis on both networking and connectivity in existing project types, and the development of new, more innovative projects that can take advantage of the new capabilities created by the Internet. For instance, in public sector management this would mean developing e-governance projects that enable government-citizen interface as well as the existing

information management projects such as tax administration.

There are, however, significant challenges specifically related to the ICT sector in the proposed efforts to scale up the use and deployment of ICT in sector projects. For instance, providing health information online will not be useful unless people have the means to actually access the information, that is, they are connected to the Internet. In a similar way, providing the technology to pay taxes online, or allow citizens to communicate with the government online will be of limited use until citizens are able to access the Internet. Solutions to these problems through sector reform and public access projects must be addressed in parallel with sectoral IT initiatives. Sectoral projects will also have to tackle complex institutional and training reforms required to maximize the benefits of the new ICT. Finally, sectoral programs to encourage the expansion of ICT use in government and other services are also connected to the legal and policy environment related to Internet content, such as validity of electronic records and digital signatures, authentication standards and certification authorities, legal protection of intellectual property rights, and legal rights of interception and review.

This Annex discusses how ICT in general, and new technologies in particular, are transforming sectoral operations, and how they can be deployed to further sectoral goals. For each of the sectors, some general points are made about the application of ICT, and illustrative examples are provided.

Public sector management

The impact of ICT on public sector management is central to two processes: the first relates to the internal operations of governments, and the second to the government's interface with the public at large. First, ICT increases administrative efficiency by making the collection, maintenance, flow, and management of information faster and easier, and thus reduces the unit cost of information. This effects areas such as tax administration, land registry, public finance management, pensions, and social security administration. Second, ICT makes governments more transparent and accountable, and thus reduces corruption by making

information more easily available to the public. Interactive technologies also enable better government-citizen interface, allowing, for instance filling of forms or registering concerns online, increasing both efficiency and transparency.

While public sector management comprises the largest component of the World Bank's IT portfolio (42 percent), most of these projects are concerned with increasing the efficiency of the internal operations of governments. ICTs have an enhanced potential in governance today—in fulfilling the strategic objectives of decentralization, accountability and combating corruption, and in improved service delivery and dispute resolution. While governments the world over are going online, putting information on publicly available websites, usually with an interactive feedback component, this has not to date been a significant part of the World Bank's work in the sector.

Bridging the gap between purely technical solutions and purely organizational ones requires expertise on how the two are linked. Successful technology application requires at least two preconditions: institutional—policy, legal, and organizational—changes that make the institutional environment receptive to technology solutions; and skills upgrading and training to enable organizations to use new technologies. Policy mentoring is necessary to obtain the first precondition, to identify where the potential blocks to ICT diffusion are, and how they might be overcome. For instance, both apathy and active resistance on the part of administrative officials who fear a loss of discretionary power might scuttle the program. These obstacles need to be identified and resolved through changes in the incentive structure for instance. Given the Bank's focus on increasing transparency and fighting corruption, ICT could be a crucial instrument to achieve this. Projects such as *Serviço de Atendimento ao Cidadão* serve as useful models for a future World Bank Group agenda, one that uses the civic governance potential of ICT.

The SAC Project

Serviço de Atendimento ao Cidadão (SAC), also known as the "Shopping Mall for Public Services," is a system of public service assistance created by the State Government of Bahia in Brazil. It gathers in one place different public services delivered to citizens by national, subnational and local institutions. In doing so, SAC gives the users the impression of a single system, although each service has a specific administrative procedure. The coordination of the different services is done only at the point of delivery to the public.

The idea germinated from the success of an integrated public service stand set up for Bahia's

Information Technology Exhibition. With a territory of 567,295 square kilometers, Bahia has a population of around 12.5 million. Of the 20 SAC units created, eight are in the capital, Salvador, and the remaining 14 spread throughout the state, with six mobile units serving remote areas. SAC units compete with traditional organizations in service delivery. They have the same range of services but their rationale is to provide better quality of public service, and within a shorter period of time. SAC allows citizens to get any official document they might need in the same place. The units are open from 9 a.m. up to 10 p.m. and, on Saturdays, up to 9 p.m. A SAC unit covers 14 sectors and has the capacity to serve 600 citizens per day. It offers a range of services, from ID cards, company registration, job offers, and public housing requests, to telecommunication services, legal assistance, labor complaints, voter registration, and passport issuance. Mobile SAC units visit remote areas, and allow geographically isolated populations access to essential services, such as the issuance of birth certificates, ID cards, and labor ID cards.

SAC is managed by SESAC, or the General Board for the Development of Public Services and Public Service Delivery, a body with a special status within the Secretariat of Administration. SESAC has a certain level of autonomy and an annual allocated budget. However, this does not allow it to produce its own resources, and the collected funds must go to the state treasury. SESAC is in direct charge of planning, promoting, coordinating, following up, assessing, and supervising public service delivery. It also looks after the maintenance and expansion of individual SAC units. Each SAC unit has a manager in charge of service quality maintenance, teamwork promotion, facility and equipment maintenance, personnel, material, and property management, statistics on performance, and suggestions for improvements in the unit. The personnel report to the supervisor in their own department, while they report functionally to the unit manager.

Improving citizen-government interface: the TWINS project in India

Andhra Pradesh is the first state in India to design a statewide computerization program covering all levels of the administrative spectrum, from the smallest—the village level Mandal Revenue Offices—to the top-most, largest, and most powerful. For example, land registration offices throughout the state are now computerized under the Computer aided Administration of Registration Department (CARD) project. The Mandal Revenue Office Computerization Project has followed the CARD, with several applications being

planned and implemented, such as the delivery of statutory certificates for caste, birth, and a hazard mitigation information system.

Another high profile IT initiative, the Twin Cities Network Services (TWINS) pilot project, was launched at the end of December 1999. It is designed to provide citizens of Hyderabad and Secunderabad computerized one-stop Integrated Citizen Services Centers (ICSC) to handle a variety of services. These would include payment of utility bills and property taxes; issuing certificates (birth, death, caste, and income); issuing permits and licenses; providing information (building permits, transport procedures and property registration); and facilitating common transactions such as change of addresses, transfer of vehicle ownership, etc. More services may be added later to the ICSC. The project will procure and install necessary hardware and software at 15 centers; provide computer training and use of the integrated services for seconded department staff; and test whether recurrent electricity and telephone costs can be reduced by passing on a small amount of the charge to the customer.

Implementing the ICSC required changes in the systems and procedures of six government departments. Some forms were simplified, and all had to be made accessible through the ICSC. The interface software between the ICSC and the departments took almost six months to develop and implement. ICSC staff at the counters had to be trained to provide a variety of computerized services. The software applications and interfaces with the various departments are now stabilized. The initial start-up costs of about Rs. 90 lakhs (\$214,000) include civil construction, hardware, software and peripherals, and integrated services digital network (ISDN) lines. There is currently no electronic payment system or electronic filing, nor is the system fully web-enabled, which would eventually reduce the need to commute by citizens who have access to the Internet. When the ISDN line fails, services are provided manually. But none of this seems to decrease the credibility of the project among the public. The pilot is part of an overall state government IT strategy, and it is too early to judge its efficacy. But by all appearances TWINS seems likely to improve interaction between citizens and government departments dramatically through quick and convenient access to automated services.

E-procurement

The shift to electronic procurement (e-procurement),⁸ is an inevitable trend among governments worldwide that can be turned into a strategic driver of public policy, legal, and performance improvements in the public sector. For example, e-procurement can be a major

contributor to the anticorruption campaigns of governments worldwide. By allowing widespread tendering, electronic document management, electronic authentication and logging of all transactions, it can substantially reduce the opportunities for corrupt practices, and increase the likelihood of their detection and prosecution. E-procurement can be strategically used as a driver for e-government (the conversion of government services and functions from the physical to the online realm), because:

- Benefits are clear. Economies comparable to those driving the explosive growth of e-commerce in the private sector should be available to governments.
- Adoption can be rapid. For example, it took less than three years for Compranet, the e-procurement system of Mexico,⁹ to expand and process virtually all of the competitive procurement transactions of the public sector (25,000 per year).
- It requires low level of public investment and can be self-sustaining through participation of the private sector. Profit oriented firms in the U.S. have teamed to develop e-procurement portals for government without any form of government investment or subsidy. The same might happen in developing countries where government is often the largest buyer in the economy.
- It is not severely constrained by poor ICT infrastructure, since it operates at the level of government agencies and businesses that are frequently connected even in the poorest countries.

Through its potential impact on legal reform and government efficiency, e-procurement presents a clear opportunity for the World Bank to embrace the networking revolution within its core assistance strategy. In so doing, the Bank would also develop expertise for broader utilization of electronic digital networking as an essential component of most of its future operations. The World Bank can adopt an ambitious, yet low cost support strategy for e-procurement,¹⁰ consisting of:

- Partnering with client countries for pilot e-procurement projects. This has started already through the September, 2000 agreement with the Government of Mexico to pilot test Compranet with transactions financed by the World Bank for over a year, starting with national competitive bidding procurements and following with international ones.¹¹
- Using institutional clout to encourage the formation of private e-procurement services and systems. OCSPP has already started on this path by identifying major e-procurement systems suppliers and their offerings; drafting the World Bank Strategy and Borrower Guidelines for e-procurement; and organizing a workshop on this subject (December

2000) to start the development of a project pipeline.

- Developing internal capacity for rapid financing of e-procurement projects, through model loan instruments, mobilization of TA, and guidance on financing schemes.

Education

Education is an area where the World Bank has a number of initiatives to connect schools worldwide and provide learning centers and content, such as World-Links, the Global Development Learning Network (GDLN), the African Virtual University (AVU), and EdTech, and projects such as the Turkey Basic Education project. These programs have targeted specifically the twin objectives of deployment of ICT to achieve sectoral goals, while at the same time addressing the need for these countries to get connected to the Internet.

On the one hand, education is a crucial input into the knowledge economy. On the other hand, new technologies enable more extensive delivery of education. Education is important because the knowledge economy is driven by both the predominance of technical skills that contribute to the economic process, and the ability to access and integrate knowledge into everyday economic activities. With knowledge being vital for the productive process, the ability to apply knowledge determines economic success.

Informatics skills are essential resources for both public and private sector organizations seeking to integrate into the information economy. Over the next few years, most client countries of the World Bank Group will need to significantly increase their number of informatics specialists, in addition to diffusing computer literacy throughout the workforce. Long-term strategies for ICT diffusion among the wider population must be centered around revised education policies and integrating ICT skills into programs of vocational training, which emphasize information handling skills, business and management skills, and entrepreneurship. An essential component for building ICT resources will be school education for young people. An integrated policy for increased ICT investment in education, teacher training, and technical support is the only way to ensure effective local adoption of ICT and long-term diffusion.

Familiarity with computers is essential in most modern professions or careers. There is a tremendous wage premium associated with technology. However, there are inherent poverty and income inequality issues related to access: computer technology is expensive, and unless specific action is taken to redress the imbalance, the rich will be in a far better position to

exploit the opportunities than the poor. Approaching ICT skill acquisition as a process of lifelong learning can help overcome some of these inequities. Women who have moved out of the labor market, whose skills are outmoded, and who wish to return to work should be assisted through specialist retraining courses that will target the new job market. To increase alternatives available to poor and vulnerable groups, parallel initiatives will need to be undertaken in the areas of SME development, access to credit, service and tourist industries, and cottage industry development and marketing. Opportunities from computer technology for bringing additional services to the poor should also be examined.

Governments can support lifelong learning initiatives by restructuring the education system to create new opportunities for citizens of all ages. Those who wish to return to school as adults should be provided with the opportunity to do so through night classes, part-time study, or as full-time "mature students." Computers and an Internet connection can open doors to those in isolated rural areas, those who work most of the day from home (in domestic and/or productive activity), and those who wish to continue their education. To help individuals finance the cost of lifelong learning, an initiative proposed for Singapore which seeks to establish a lifelong learning fund could be a potential model. In this approach, when the economy performs well, a special dividend can be paid into each citizen's account, and the money (or equivalent in study credits) can be used to further an individual's study, or used to acquire additional employment skills or knowledge.

Advances in ICT also enable new mechanisms for the delivery of education. Distance learning, using the capabilities of convergent technologies in particular, has become very important as a means of extending high quality, world class education. ICT provides new tools for teacher training. The concept of the telecenter is a useful means of extending education. The telecenter can become the means of delivery for distance learning and virtual education. For instance, the distance learning centers operated by GDLN deliver a host of courses, using a variety of media.

ICT in education: Turkey Basic Education Project

The Turkey Basic Education Project (Loan 4355-TU), approved by the Board in June 1998, is the largest project in the Bank's informatics portfolio. The project extends computerization to grades one through eight. In phase one, the Ministry of National Education (MONE) is establishing IT classrooms in 2,600 basic education schools throughout the country—at least two schools in each of the 900 subprovinces. In phase

two, it will equip an additional 3,000 basic education schools with Internet capacity. In the final phase, 5,000 IT classrooms will be established. The project's four components make it a comprehensive package for ICT in schools: expansion of computerization to include connectivity; evaluation of computer literacy achieved through the project; emphasis on covering rural areas; and extensive training for teachers to ensure capacity building in the use of the technology. In addition, a significant number of schools will participate in the WorLD program, which would link them to national and international school networks.

Turkey's education system is rigid and highly centralized. Curricula and textbooks are approved centrally for use throughout the country. Teachers are recruited and assigned centrally. Students are admitted to universities and the best secondary schools through centrally administered examinations. Introducing Internet access might combat this rigid and centralized system, and enable greater interactivity among teachers and students. However, the impact of introducing an interactive learning medium can be built into the evaluation framework that the government's Education Research and Development Department has already put in place to monitor the program.

Since the project's emphasis is on rural schools, most of the IT classrooms—almost 76 per cent—are in subprovinces. Because few children in rural schools currently have access to computers, this initiative, combined with a number of other important investments in rural schools provided under the project, will help reduce urban-rural differences in educational facilities and performance.

Throughout the project, MONE has included extensive teacher training. The ministry prepared and distributed handbooks on the effective utilization of IT in classrooms. In addition, two-thirds of the teacher training courses under the program covered IT subjects. The ministry is presently considering an interesting scheme to encourage teachers to purchase computers and Internet access for their own use, which would contribute not only toward computer literacy for teachers, but also give them a sense of ownership of the program. Experiences from other countries were investigated for adaptation in Turkey. Chile and Sweden have offered teachers computers on a onetime, smart-subsidy basis. The U.K. government subsidized computer purchase for teachers by up to 50 percent from an authorized list of suppliers. The Ministry of Education in Brazil is initiating a similar loan scheme, with subsidized interest payments (at 25 percent of the market rate), and long repayment periods (seven to eight years).

World sponsored Internet Learning Center

The Bindura Internet Learning Center (ILC) is an example of a school-based community telecenter. Established as a successful partnership between the Zimbabwe Ministry of Education, Sport and Culture and the World Bank-sponsored Zimbabwe-WorLD, the Bindura ILC is one of a series of 13 school and community centers which were opened in 1999. Each center is equipped with Windows and Office '95/98 software, 10 networked computers, a server (running Windows NT software), printers, modems, and an Internet dial-up connection. Similar to the model adopted by the other Zimbabwe-WorLD sites, Bindura is a successful model of a dual-use telecenter, serving students and teachers in the surrounding schools during the day, and the general community and adult learners in the evenings, weekends, and holidays. The adult learners constitute 50 percent of the total clients served, and are an important source for the center's financial sustainability. By paying a fee for training and access, they are underwriting the recurrent costs of hardware maintenance, power, supplies, and connectivity.

The approximately 180 pupils and teachers come from nine surrounding primary and secondary schools. Two full-time teachers provide these learners with instruction in computer literacy, software applications (e.g., Word, Excel, PowerPoint, desktop publishing), and online collaborative projects, which will link these students with their peers around the world via the Internet. Adult learners receive instruction in operating systems, software applications, and research via e-mail and the Internet. Specific client groups served include officers from the Ministry of Education, lecturers from the nearby Bindura Technical University, and students from the Zimbabwe Open University. A majority of these users, approximately 70 per cent, are women.

Because the WorLD program does not finance any recurrent costs, the dual-use center provided a means by which to recover costs by serving not only a student community, but also the fee-paying adult community. The center has brought in an impressive Zim\$200,000 (\$5,000) within the first six months of operation. This will help to underwrite the ongoing phone and maintenance charges, as well as contribute toward staffing incentives, and new hardware and software acquisition. The teachers are direct beneficiaries, receiving 25 percent of all the non-school hour income as incentive for all the extra hours which they spend at the center, particularly in the evenings, on weekends, and holidays. The extra income has also paid for the acquisition of a new color printer, replacement cartridges, a new monitor, educational CD-ROMS, and stationery.

E-learning

All countries, especially the developing ones, face shortage of skilled IT workers. Without an adequately trained IT workforce, the promise that Internet access has to offer will never be fully realized. The numerous consequences of such shortage include: slowed economic growth; a loss of foreign investment to countries with greater supplies of trained personnel; missed business opportunities; negative impact on the growth of communications, Internet, electronic commerce, and electronic business; inflated salaries and higher turnover of skilled labor, leading to increased operating costs and lower profits; and outsourcing of IT-related work to overseas markets.

A majority of e-learning companies offer training in IT skills online—a critical area if the World Bank Group's client countries are to be able to take advantage of IT—and many also offer courses in management, accounting, and other business-related training needs. E-learning also opens the doors to the tight tertiary education markets that most World Bank Group client countries are experiencing; it offers opportunities to upgrade the skills of teachers, a particularly dire need with the loss of so many to HIV/AIDS; and can provide on-the-spot training across a range of sectors.

Major reports published by investment firms are urging their investors to consider seriously e-learning as investment and training opportunities, and developing countries might become important markets for this. A report published by SunTrust Equitable Securities argues, "However significant the impact on the consumer and business markets, we believe that the Internet will have the greatest influence on the process of learning; e-learning will change our lives." In the report, John Chambers, CEO of Cisco Systems argues, "Education over the Internet is going to be so big it is going to make e-mail look like a rounding error."¹² This illustrates the growth potential venture capitalists see in e-learning. Over \$1 billion in private capital has been distributed to e-learning companies, and more than \$302 million in public equity were raised in 1999 alone.

ICT for sustained education

An innovative experiment from Ahmedabad, in the state of Gujarat in western India, has been exploring possible gains from subtitling song sequences from Gujarati language films in the same language. Researchers have confirmed from a sustained experiment in a government primary school, that this leads to measurable gains in a neoliterate person's reading ability.¹³ The findings convinced Doordarshan (Indian national television) in Ahmedabad to telecast three

such subtitled programs. Audience reaction was overwhelmingly positive: some found it useful to sustain literacy skills, others found they could understand every word and even sing along. Even those with a hearing deficiency could now respond to the "content" of the songs.

Doordarshan in Ahmedabad has agreed to telecast Chitrageet with same-language subtitling for a six-to-eight-month period. Educationists claim that this simple addition makes Chitrageet itself more entertaining and will, in the long run, make a phenomenal contribution to local literacy skill development. Audience feedback confirmed that same language subtitling invites reading, but does not compromise entertainment, making it useful for both the literate and the partially literate.

Finance

ICT is transforming the financial sector in the First World, as new and improved applications are being developed to support all types of financial services. A large financial institution cannot function without the use of ICT, since these systems are crucial to profitability. Financial institutions have invested very heavily in ICT over the last decade in the developed countries. Estimates of the cost of work on Y2K alone, for example, for the U.S. securities industry came to over \$5 billion. Telecommunication and mobile telephony are opening up new possibilities for delivery systems that can be cost effective for a much wider range of services.

Internet banking is already well entrenched in several Scandinavian countries, with tremendous cost savings. Competition is very stiff in the area of securities trading, clearance, and settlement, as traditional exchanges position themselves to compete with Electronic Communications Networks (ECNs) and investment banks, while seeking to establish more efficient trading, clearance, and settlement platforms. Finally, the supervision and regulation of the financial sector are becoming more and more dependent on technology, and on understanding the technology to design market-friendly and effective regulatory frameworks.

The July Report from G-8 Finance Ministers, "Impact of the IT Revolution on the Economy and Finance,"¹⁴ underscores several key changes driven by IT in the financial sector, including Internet-supported transactions, the extension of financial services globally, "virtual financial sites," innovative risk unbundling, extended use of derivatives, and the entry of nonfinancial companies in the sector. An essential objective, from the public policy perspective, should be to preserve market integrity without inhibiting private sector initiative.

The global impact of IT on the financial sector and the need for policy adjustments are clearly recognized by the G-8 countries and must be appreciated by all countries interested in benefiting from the IT revolution. However, the resulting economic transformation is not evenly distributed across the globe. Unless urgent action is taken to change existing trends, the benefits of IT will not reach many emerging economies.

Some of the innovative activity in the developed countries' financial sectors is spilling into the emerging economies, primarily through the reach of large multinational financial institutions, such as Banco Santander, Citibank, Deutsche Bank, and others. However, this is essentially on an *ad hoc* basis, being driven by the strategies of individual private sector institutions. Private financial institutions do not necessarily have economic development as their short-term objective in emerging economies. As a result, the benefits of technological innovation often do not reach the least developed areas. Nor is there any direct private support available for the development of the financial sector in these countries. Small and medium sized companies already have difficulty accessing the financial sector. Without a more organized effort on the part of the World Bank, the private sector, and strategic partners, access to the financial sector will become even more limited.

In this context, the link between ICT and the financial sector, and the importance of ICT for the survival of heterogeneous financial markets and small and medium sized companies in emerging economies, becomes obvious. The World Bank should take a systematic approach to supporting the adoption of new technologies in emerging economies. The ICT and financial sectors are interacting in new and productive ways, and the World Bank should tap into these sources of innovation more actively. By targeting specific areas of interest in technological applications for finance in emerging economies, the World Bank Group can provide effective support in improvements in design and implementation.

One problem in many emerging economies is that financial sector ICT projects are technology-driven. The business needs of the institutions and markets are not adequately taken into account, and the local social and cultural practices affecting trade and commerce are often completely bypassed. Financial institutions focus on hardware, and to a lesser extent on software, as promoted by the vendors. Preparation and analysis of business needs get little attention. Customers often lack sufficient preparation for the project, and are not ready to provide the necessary support for implementation. This is an area where the World Bank, as an honest broker, could provide support to client

countries, to increase the success rate of ICT projects.

An outline of the strategy for ICT in the financial sector as embodied in the Financial Sector Strategy Paper is provided here:

- Build on existing ICT work more systematically, in mature areas, such as Real Time Gross Settlement Systems, and develop more streamlined procedures (China, Mauritius, Vietnam).
- Develop diagnostic tools for ICT in the financial sector for restructuring financial institutions, and build on existing work done in Asia.
- Examine new initiatives in technology supporting the financial sector, to identify those that could be adopted easily in emerging economies. They could be, for instance:
 - ~ Microfinance, and telephonic banking (Bangladesh, India, South Africa, and others).
 - ~ Internet banking (Denmark and Finland), and lessons for emerging economies.
 - ~ Trading platforms and ECN, and their possible use for regions (Central America, Northern Africa, Western Africa).
 - ~ Card technologies, as access devices for the Internet and ATMs, and as store of value cards.
 - ~ Telecommunication links with banks, joint strategies for privatization, and delivery systems for the financial sector.
 - ~ Private sector alliances, with technology and the financial sector (Bankers Association for Foreign Trade and international organizations).

The role of technology in the supervision and regulation of financial markets is essential and growing, and the World Bank should be identifying and promoting the best practices on the technology side for financial sector development. This can be done in conjunction with the Bank of International Settlements and other international efforts on standardization in the financial sector.

Small and medium enterprises

One of the important characteristics of ICT is that it allows access to a global market for even a small business with minimum initial investment. ICT, therefore, provides a unique opportunity to promote the growth of small business as an instrument of development in countries where capital is scarce. Moreover, by encouraging domestic entrepreneurship, it enables sustainable development, and strengthens the local economy. IT is becoming a major tool for SME around the world to enhance their competitiveness. The Internet opens new opportunities for training, mentoring, and advisory networks that link worldwide experience and knowledge with local entrepreneurs. Internet access makes a great difference in the lives of SME owners in

developing countries, especially those located in small towns and remote areas. New avenues open up to develop a competitive edge, and to build new technology-based capabilities, competencies, and markets into existing business plans. The World Bank Group can play the role of knowledge broker and facilitator to make e-commerce a strategic tool for SME in the developing world.

A number of initiatives are currently underway within the World Bank Group to promote the Internet as a tool for development for SME. These include free computer access and training for SME entrepreneurs, e-commerce proposals, seed/venture capital for Internet-related start-ups, and general Internet training and access. Other pilot projects include a small business portal; information access service; off-line training and service provision; Internet skills training; SEAF.com; and "angel" networks in Latin America.

Core strategies proposed for integrating IT into broader involvement in SME are:

- to better understand the IT needs of different categories of SME in different regions;
- to collect, evaluate, and disseminate information on SME and related agencies;
- to facilitate the provision of value-added services to SME and related agencies; and
- to identify, adapt, and promote appropriate IT as part of SME initiatives targeted at more disadvantaged groups.

E-commerce for poor artisans: the Virtual Souk

Artisans from the Middle East and North Africa have always crafted high quality products using traditional techniques. But local markets have been shrinking recently, and it is difficult for rural artisans to cover great distances to reach more lucrative national and international markets where their work would fetch high prices. This is leading to the gradual disappearance of culturally rich crafts. In many cases, the artisans who produce the most authentic and fine work are also the poorest, with the least access to markets. Therefore, it is necessary to bring the market to them without standardizing their work or incurring high intermediary costs, and provide opportunities for the artisans to organize themselves in order to meet market demand.

The Virtual Souk¹⁵ was started in January 1998 to eventually create a financially sustainable, decentralized, and locally controlled web e-commerce operation for the artisans. The preliminary activities represent a combination of awareness raising, capacity building, network strengthening, and the expansion of use of new technologies. Among these are:

- creating on the web a user-friendly and multilingual catalogue of products and artisans from the

Middle East and North Africa (MENA) region. (www.elsouk.com);

- writing a series of guides (commercial chain, website design, e-commerce), and training modules (managerial and technical) to build capacity in the region's network of NGOs and artisans;
 - conceiving and running training workshops;
 - participating in awareness raising events;
 - participating in regional conferences on e-commerce;
 - demonstrating the replicability of the Virtual Souk to regions other than MENA.
- The anticipated outcomes of the Virtual Souk are:
- poverty alleviation through increased income of isolated groups of artisans;
 - better access to international markets and increased trade;
 - establishment of a commercial chain with secure payment system for small artisans and grassroots groups;
 - building of technical and managerial capacity of participating artisans and NGOs;
 - promotion of empowerment and self-confidence of participating artisans and NGOs;
 - preservation of the cultural heritage;
 - increased demand for connectivity, and better access to information.

Matching grant program in Indonesia

The Technical Assistance and Training Program (TATP) is an ICT matching grant scheme for SME under the World Bank's Indonesian Information Infrastructure for Development Project. It is a three-year project providing cost-sharing grants to SME to make ICT consulting services and training more affordable and accessible. ICT consulting and training provided by private sector consultants and trainers to SME are eligible for funding.

TATP began operations in March 1, 2000 and will continue until February 28, 2003. It plans to disburse \$3.5 million in grants to SME over the three-year period. Grants are administered by a private sector entity referred to as the management contractor (MC). The MC processes grant applications, and monitors and evaluates contract activities between SME and service providers that are carried out with grant support. The MC has project offices in Jakarta, Bandung, and Surabaya, and covers three more cities, Semarang, Makassar, and Medan, through the Kanwil offices.

In the first eight months of TATP operation,

- grant funding was received for 1,031 applications;
- 48 proposals, with a value of \$1.1M, were submitted to the Ministry of Industry and Trade, Indonesia (MOIT) for approval;

- 31 proposals, with a value of \$805,000, were approved by MOIT;
- 22 contracts, with a value of \$527,000, were signed, and all 22 are currently being implemented. Of the 22 signed contracts:
 - 55 percent will introduce computerized systems to replace manual operations;
 - 45 percent will improve existing computerized systems;
 - 54 percent involve more than one SME, cooperative, or foundation;
 - 18 percent involve a single cooperative (with each cooperative having several members); and
 - 28 percent involve a single SME.

Health

Health care is a highly information-intensive industry. The information sharing and management functions of ICT can benefit the health care sector in several important ways. The performance of the health care system is contingent on accurate data collection and analysis through needs assessments. Also, sustainable health financing cannot be accomplished without precise public and private health expenditure reviews. E-mailing of test results from labs to clinics; phone systems to call ambulances and alert referral hospitals of incoming patients; better drug inventory management to help prevent stock-outs; and automated billing/collection systems all use ICT to add value to the sector. At a more sophisticated level, information systems today allow a radiographer to read images from anywhere in the world.

Finally, national or decentralized health information systems can provide customized data for local problem solving, but efforts to collaborate internationally are becoming increasingly important.

In developing countries, however, health services suffer from information gaps, as much as they suffer from infrastructure gaps. While concerted effort needs to be made to overcome the infrastructure shortage, combining this with an ICT strategy where adequate resources exist provides a means to overcome the information shortage. Moreover, medical specialists are a scarce commodity in developing countries, and usually concentrated in metropolitan areas and major cities. Telemedicine techniques make it possible for these specialists to extend their reach by receiving and attending to consultations from patients located in outlying areas. The Internet provides medical practitioners in remote locations with a means of keeping up to date with latest developments in medical research and pharmaceutical products. Telehealth covers the broad range of services provided across distances by phone, radio, e-mail, the Internet, and every other form of

communication and data recording. The Internet and mobile phones are simplifying much of the data collection process, making it possible to have wide coverage of a population, and to reach remote areas. The old obstacles of record management and paper filing are fading away.

Telemedicine uses ICT to transmit medical images, records, and diagnoses to remote locations in order to overcome shortages in regional health care providers. Technologies include Internet related applications (e-mail, satellite transmissions, etc.), audio-visual conferencing, and standard as well as other forms of radio telephony. In Gambia, nurses on a remote island river use a digital camera and a laptop to photograph visible symptoms that they cannot recognize and/or treat. The images are transferred to a physician in Banjul, who either prescribes a treatment or forwards the images via e-mail to a company in the U.K., which can access specialists around the world and report back findings.¹⁶

Geographic information systems (GIS), Internet, and telecommunication together can be a powerful force for coordinating health care delivery in areas where disease is rampant and communications are poor. In a group of sub-Saharan countries referred to as the "meningitis belt," the World Health Organization (WHO) has implemented an electronic system by which daily reports of disease outbreak are relayed to health professionals, who collate the data and use findings to target mass vaccination programs. E-mail and medical list-serves can automatically deliver recent medical findings to a wide audience at minimal cost.

There are already a number of Internet-based services that provide answers to practitioners and consumers about diseases, disease management, and therapy. There is still a need to establish, and strengthen existing global systems to share and respond to information; to yield more consistent, detailed and comparable national and international data; and to facilitate the exchange of technical expertise. There is need to develop new diagnostic, preventive, and curative agents for the health problems of developing countries, which the poor can afford; ICT has a role in the development and testing of such agents. It also has a role in the management of health services through which it is delivered, and in the education of the providers and users of those services.

Governments, donors, NGOs and private sector health care providers are experimenting with a wide variety of ICT applications in support of improved health delivery. Projects range from linking rural providers to the Internet, using satellites to transmit information (often between continents), and automating

surveillance, management, and record keeping functions in order to improve efficiency, extend coverage and reduce costs.

Information-based health care delivery in India

infoDev and CMC Limited, a Government of India enterprise, are together working toward optimum use of scarce health care resources in the southern state of Andhra Pradesh in India. The purpose of the project is to improve the effectiveness of preventive health programs in the state, and increase the efficiency of the auxiliary nurse midwives (ANMs), a small band of women who shoulder most of the weight of health care delivery in the vast and densely populated rural areas. ICT, together with the Personal Digital Assistant (PDA), is expected to facilitate data acquisition and transmission to the Primary Health Centers for the purpose of providing timely support to the ANMs.

Along with health care delivery, ANMs are also responsible for demanding data collection and paperwork. The approach is to train the health workers in the use of PDAs to process the data more easily. The PDAs are designed to cater to the literacy levels of the health workers. The use of PDAs will improve the reliability of data, thus saving up to 40 percent of their work time. The project will be extended to different sites in other districts of the state and eventually to the national level. It will help to reduce and eliminate the redundant entry of data prevalent in paper registers, generate automatic ANM monthly reports, and make data electronically available for further analysis and compilation at higher levels of the health care system.

Health networks

HealthNet and Satellife (<http://www.healthnet.org>).

Using a diverse array of ICT technologies (including radio and telephone based computer networks and low-earth orbit satellites), HealthNet serves health care workers in 30 developing countries. Practitioners can use the service to access medical research, exchange data on emerging epidemics, and obtain information on the use of drugs and treatments. A particularly innovative feature is the diverse array of moderated electronic discussion groups that cover topics ranging from emerging trends in infectious diseases to regional coordination of research efforts containing a specific geographic component. HealthNet and Satellife are separate programs but operate together with funding from donor countries in both developing and industrialized countries.

MARA—mapping malaria risk
(<http://www.mara.org.za>)

More than one million people die from malaria each year, the vast majority in developing countries. MARA, a partnership project between a number of international donors and the Government of South Africa, collects data on malaria risk and resistance patterns from five regional centers, and produces outputs that allow health care practitioners and researchers to better treat and study the disease. The data and maps produced by the initiative can be used to:

- allow regional transmission patterns and severity to be defined and targeted for control measures;
- allow geographic targeting of control resources (human, financial, and technical) to critical areas;
- spatially define regions of similar disease type;
- encourage regional application of appropriate control strategies; and
- serve as a model for the study and control of other diseases.

Gender

The promise of a new e-economy is meaningless for women who have no access to opportunities offered by the new technology.

In most societies, women are encouraged to choose academic disciplines that have employment and equity implications. Gender biases in textbooks, in school structures where positions of authority are held by men, prevailing social norms, and a strongly gender-differentiated workforce make it difficult to change deeply entrenched attitudes to women's lives. Marriage and child bearing often require women to withdraw from the labor force, and return to it disadvantaged by this absence. Even when women enter the work world with similar skills and training and remain as long as men, they are often discriminated against in terms of pay and advancement.

Wherever existing gender stereotypes are reinforced by the educational system, women tend to be overrepresented in the humanities, social sciences and "soft" sciences such as biology. A low percentage of women science and technology graduates seriously limits the pool of women suitable for recruiting into technology industries.

Some general interventions that will help to increase the number of women in technology are:

- desegregation of academic fields by gender;
- removal of practical and sociocultural obstacles to women accumulating skilled technical experience;
- provision of outreach systems and networks to encourage women to enter, remain, and succeed in technical fields.

Generally, women experience greater difficulties than men do in gaining access to and benefiting from resources. In developing countries, there is evidence that gender inequalities are increasing even as the nations make bids for a competitive market economy and technological progress. Unless this regressive process is controlled, the transition to a knowledge economy will not only be incomplete, but also widen the gender gap and perpetuate some of the worst obstacles to social change.

In East Asia, the financial crisis brought to the fore some of the inherent workplace discriminations. Women were the first to be laid off. Regular employees were sacked and then rehired as temporary employees. Women over 35 found it very hard to get new employment. Although, since the crisis, opportunities for retraining have opened up, they do not ensure that women will get the training that will provide them “real world” jobs.

On the other hand, women exposed to training in ICT can participate fully and productively in the creation of a knowledge economy. Internet access with specific focus on women and girls, especially in rural and remote areas, will promote the growth of the economy through knowledge sharing. Interventions for rural women that can benefit the economy include the provision of current information on genetic resources, farming practices, medicine, and other fields using databases available via ICT.¹⁷

Growth of the e-economy offers possibilities for business and self-employment to women in the informal sector. In Bangladesh, the Grameen Bank has an initiative to empower women by supplying credit to buy cellular phones. The business possibilities of selling telephone services to others has created or augmented the women’s capacity to generate income. The phones have also helped them to cut down on business related travel expense and time. However, women in the informal sector continue to need market information and business skills as much as hardware, software, and connectivity to be able to fully participate in e-commerce

Women form the majority in the lowest income communities. When the poor lack access to services, resources, and opportunities, they are deprived of a means of getting themselves out of poverty. In a knowledge economy, when the basic resources (telephones and computers) are themselves costly, the fear is that the poor will find themselves increasingly excluded. Even in countries where overall levels of poverty continue to shrink, the population left in poverty face serious challenges which cannot be overcome merely through steady national economic growth.

Access centers for ICT created with government

funding allocated through libraries, schools, and post offices, would provide community-based access points for the poor. The involvement of NGOs, particularly those for women, can dramatically expand the use of ICT. The Canadian VolNet Initiative, or E-Mail Addresses for All Citizens in Sweden, represent possible models for developing countries. Ireland too is initiating E-Mail for All, a program supported by the government, covering anything from simple promotion of services available in the marketplace to actual procurement of e-mail service for the public. Another Irish option under consideration is the promotion of community involvement through a nationwide event to provide communities with opportunities to access and learn about the Internet.

Opportunities exist for enhancing both democracy and women’s participation through ICT. Gender-sensitive local community portals would encourage participation and the production of information relevant to local communities. Community portals would also provide women with a medium to participate as producers/consumers, providers/users, and counselors/clients. Women’s NGOs and other community groups should be provided with training and hardware to set up local networks, and develop websites that offer services relevant to them.

ICT makes distance less significant in business and production, particularly for multinational corporations. The current trend towards global networking has led to massive relocation of information-intensive service sector jobs from high-wage to low-wage countries. A large portion of the outsourced jobs already go to women. However, a key remaining issue is to identify skills sought by multinationals, and incorporate these into women’s education and training. The need to safeguard telecommuters—and women in particular—from being disadvantaged in comparison to office-based workers who receive benefits such as health coverage, retirement, and social protection, is of equal importance.

In Morocco, the government has set up town portals on the Internet which provide information about the community, and act as entry points for enhanced accountability.¹⁸ In South Africa, women’s organizations are linked to various resource websites, which aim to mobilize women around issues important to them—a human rights website that makes available practical information for women, and another which helps the community radio produce gender-sensitive content and programs.

By enhancing the community’s ability to interact with a broader public arena, ICT can support the development of a rights-driven, modern, decentralized state accountable to its citizens. By encouraging a

transparent polity, ICT can protect the people and promote social justice and equity. It can create an enabling environment through competition, innovation, and the development of human capital. Through awareness and utilization of all these opportunities offered by ICT, women will ensure their own empowerment.

Networking and gender equality in South Korea

In March 2000, South Korea launched a nationwide campaign to teach basic Internet skills to one million housewives over 18 months. In Seoul and nearby cities, nearly 70 percent of private computer institutes joined this government program, which provides 20 hours of Internet courses per month for just \$27, much lower than the market rate of \$90. Singapore too began three new initiatives in March 2000 to extend the use of computers and the Internet to low income households. The Info-Communication Development Authority of Singapore has committed approximately \$15 million over three years for initiatives, which include the provision of a free computer with Internet access and basic training to 30,000 low income households. The same government body will also provide free broadband Internet access at community centers, and develop targeted Internet programs for different population segments in their efforts to bridge the language gap.

Rural development

For most rural people, information on market price, credit and financing opportunities, and access to new technologies are difficult to procure. In addition, government services and benefits are underdeveloped, which isolates rural people from the central government, and marginalizes rural concerns from the development process.

Providing access to communication technologies in rural areas brings many advantages. Farmers and other rural businesses can obtain the highest possible price for their goods and bypass intermediaries. In addition, supplies and other equipment can be found for the lowest possible price. Communication is integral to knowing what, where, when, and how to plant crops. In particular, global positioning satellites are increasingly being used to map soil productivity in areas as small as two hectares. Similarly, satellite imagery and Internet communication can be used to transmit data on emerging crop infestations, track weather patterns, and monitor expected yields. Rural businesses can increase their sales range, resulting in increased production, and hence employment. In terms of efficiency, the reduction of unnecessary travel alone can have a major impact on the productivity of rural businesses.

In Colombia, for example, a relatively inexpensive and simple microwave radio telephone system, along with community access points, was installed in the remote region of Tumaco in 1994. Within three years, residents of the region reported that the service had resulted in better trade and market opportunities; reduced unemployment; new business opportunities; improved information access and health care delivery; improvements in public safety and security; and overall improvement in the level and quality of available government services.¹⁹

Rural areas also, however, face special challenges in the rollout of ICTs. For the most part, isolated rural communities, with low population densities spread across large geographic areas, are not an attractive investment for telecommunication providers. Even when rural areas are linked up with telecommunication infrastructure, the results are often retrograde technologies and frequent disruptions in service. Rural areas are not homogeneous, and a particular mix of technologies must be designed with local considerations in mind.

Nonetheless, recent technology advances, such as microwave relay bases, satellite signaling, and cellular telephony have significantly lowered the marginal costs associated with telecommunication expansion to rural areas. The concept of telecenters has become very important as a means of extending rural access. These can be divided into two categories: (a) privately owned centers where local operators cater to business demand for limited services such as phone, fax, and photocopying, and; (b) multipurpose, community initiatives that seek to provide a larger set of economic, technological, and/or educational and cultural services. The growth of these centers may signal an important shift away from the "universal service" goal of bringing a telephone into every household, to a more realistic and cost-effective goal of universal community access. In Senegal, for example, more than 6,000 privately operated telecenters have come into existence since the early 1990s.²⁰ Public access to a telephone has more than doubled—with the added advantage that the cost-effectiveness of each additional line was four times greater than that of a private home line. India, Peru, South Africa, and Thailand have also seen dramatic growth in privately owned and operated telecenters providing rural inhabitants with new information sources and opportunities.

Local electronic network in Argentina

In Argentina, private companies such as Agropol and Agrositio have begun pooling farmers together through local electronic networks to purchase various inputs in bulk, which has resulted in volume discounts on

the order of 5 percent to 15 percent. In addition, both firms offer services targeted to farmers, such as bulletin boards where farmers can share information on plague alerts, obtain technical information, and even advertise their wares directly to other farmers and consumers. Analysts had estimated that 20 percent of all Argentina's farms would connect to the Internet by the end of 2000.²¹

ICT in rural Chile

A rural communication project in Chile, financed by the Government of Italy, has creatively used ICT to provide information to farmers. The effort stemmed from an experience in Mexico under a previous Food and Agriculture Organization (FAO) project financed by the Government of Mexico and the World Bank. The project established information networks that provided essential data on crops, inputs, prices, markets, weather conditions, social services, credit facilities, etc. Messages were generated, processed, and transmitted through low-cost computers via the Internet, and delivered to farmers' organizations, cooperatives, town councils, etc. equipped with computers, modems, and printers.

The information was based on an assessment of local needs. Extension services, local leaders, and institutions required better information to organize and manage agricultural development activities. The project provided the electronic network designs, equipment, logistical support, coordination, and technical backstopping. Extension workers were trained to use ICT for rural development, and to analyze and disseminate locally relevant information. Small information centers equipped with a server, computers, modems, and printers within the offices of farmer organizations and NGOs were established. These centers distributed the messages to individual farmers and associations, according to local conditions and facilities available. Faxes or printed materials were used if the Internet was not available. The messages distributed through the Internet were timely, appropriate, and transmitted in a form that could be understood by the farmers. In the past, a comparable printed bulletin took 45 days to reach the people.

By 1996, the national agricultural extension service in Chile had established an electronic rural information system, which connected farmer organizations, rural municipalities, NGOs, and local government extension agencies to the web. It was estimated that transmitting price and market information this way cost 40 percent less than using traditional methods. Within six months, the website of the electronic information system had over 7,500 hits. Much of the information available through the Chilean network

was useful to other Spanish-speaking farmers. Within a month, there were over 1,000 hits from Latin Americans outside of Chile, and a further 1,000 hits from Internet users elsewhere, including Asia, Australia, Europe, and North America.²²

Agricultural information system in Mauritius

The Faculty of Agriculture at the University of Mauritius has set up a prototype agricultural information system for use by the rural community in Mauritius. Their main objective is the use of audio files in two local spoken languages on a website that offers advice on potato growing. The group uses audio material as a means of overcoming the barrier posed by illiteracy, and to add user-friendliness for a rural community. The big question before them is: how can the computer-illiterate farmer reap the benefits of empowerment made possible by the Internet?

The focus at the moment is on one part of the agricultural community, the potato growers, in an effort to test their response to a web interface designed for their needs. A survey was carried out on the information needs of the growers themselves, as well as the main information needs of extension officers dealing with the potato industry. Information, usually available in print in technical reports, has been placed on a website with additional graphics to facilitate communication. One of the first interesting challenges has been to develop icons representing cultural practices in potato production. A series of icons were drawn and have been tested with the agricultural community. Their findings suggest the need to develop globally acceptable icons through the creation of a clip-art collection that targets the agricultural community.

ICT and rural development in India *Warana Wired Village*

In Maharashtra, a cluster of 70 villages is benefiting from a project, which is modernizing the local cooperative movement. The Warana Wired Village project aims to increase the efficiency and productivity of the existing cooperatives by setting up a computerized communications network, and by providing agricultural, medical, and educational information to the people at the facilitation booths in the villages.²³

The existing cooperative structure has been used in concert with high-speed VSATs to allow Internet access to members of local cooperative societies. The first tier of connectivity, the hub, connects to six business centers and six IT centers, and through them, to 70 facilitation booths, one in each of the project villages. The Sugar Administrative Building (SAB) in Warana Nagar is the hub for the business centers, while the engineering college acts as a hub for the Intranet

accessed by village booths. The IT centers provide facilities for distance education, computer assisted instruction, and access to the Indira Gandhi Open University. Extensive training on applications and administration of the network has been provided to the Warana users.

Gyandoot

Gyandoot is a novel example of the extension of new communication technologies for welfare and service provision in rural areas. Set up by the government of Madhya Pradesh in 1999, Gyandoot connects 21 cyber cafes (*soochanalayas*) reaching half a million people. *Soochanalayas* are located at block headquarters, marketplaces, and bus depots, and each of them provides services to 10 to 15 *gram panchayats* (village-level local self-government bodies), which cover 20 to 30 villages and 20,000 to 30,000 people. Gyandoot's website (www.gyandoot.org) provides information on business opportunities. It connects from a closed intranet within the district to the World Wide Web and offers information about the Dhar district to people who pay \$22 as a deposit to open an account. Other services offered include commodity marketing information; maps and land records; online registration of applications for income, domicile, and caste certificates, and landholder passbooks of land rights and loans; a public complaint line for reporting broken pumps, unfair prices, and absentee teachers; and e-mail in Hindi.

Environment

The greatest contribution of ICT to environmental protection is probably the least recognized. The most serious pollution comes from industries that make heavy use of energy and raw materials. Expanding ICT capacity in an economy raises the relative profitability of service activities and more sophisticated industries that are much less pollution-intensive. This shift in economic structure greatly reduces the environmental burden.²⁴ Pollution and congestion related to transport can also be controlled, as better communication reduces travel requirements per unit of activity.²⁵ ICT contributes directly to environmental protection by strengthening the regulations for environmental damage. Protecting the health of human populations and ecosystems requires frequent monitoring of environmental conditions. ICT allows many developing-country environmental agencies to record, analyze, and publish extensive environmental information.

In Brazil, for example, the São Paulo State Environmental Agency uses the Internet to update crit-

ical air pollution information. India's Ministry of Environment and Forests uses satellite data and GIS to inform the public about the level of forest cover in each Indian state.

IT also plays an important role in organizing environmental data to set priorities, model the impact of pollution and natural resource degradation, and identify the major sources of damage to the environment. While formal regulation of these sources is critical, government agencies with inadequate resources cannot possibly monitor and control all of them. Developing country environmental agencies and NGOs are using public information systems to mobilize communities and businesses to counter this problem.

Abundant evidence from Asia and Latin America shows that well-informed communities can influence environmental regulations and their implementation.²⁷ Where formal regulators are present, communities use the political process to influence the strictness of enforcement. Where regulators are absent or ineffective, NGOs, community groups, religious institutions, social organizations, citizens' movements, politicians, and other leaders pursue informal regulation, based on convincing polluters to conform to social requirements. The environmental concerns of market agents create additional incentives for pollution control. Green consumers are already well known, but investors have also become important actors. Environmentally damaging operations may signal to investors that a firm's production process is inefficient. Investors also weigh potential financial losses from regulatory penalties and liability settlements. The importance of such public scrutiny has grown with the rise of new stock markets and international financial instruments.²⁷

New public disclosure programs are using ICT. In Indonesia and Philippines, for example, national environmental agencies have used ICT to monitor factories, develop color-coded ratings of environmental performance, and disseminate the results through the local broadcast media and the web. Resulting pressure from consumers, investors, and affected communities has promoted low-cost efforts to achieve major reductions in environmental pollution.²⁸

General environmental education also plays an important role in building public understanding and support for higher levels of environmental protection. Many environmental agencies and NGOs use ICT to disseminate their messages internationally and locally. For example, the Central American Commission for Environment and Development has

recently collaborated with the World Bank to produce Cloud Forest Alive, a website that educates viewers about forest protection issues while transmitting live pictures of rare forest species in their natural habitat.

ICT itself creates little environmental damage, although producers of ICT components generate some toxic pollution. Sitting of wireless communications towers may raise aesthetic issues, but national and international health authorities currently believe that their transmissions pose no threat to human populations.²⁹ Similarly, extensive research has not established a significant link between cellular phone transmissions and brain damage. However, continued public concern has prompted sponsorship of further research on this issue by WHO, the U.S. Food and Drug Administration and other agencies.³⁰ The Cellular Telecommunication Industry Association has responded by requiring its members to include radio-frequency radiation rates with all new wireless phones.³¹

ICT and social security

ICT plays an important role in the delivery of social security, enabling institutions to automate administrative processes to provide value-added electronic services to citizens. In this context, ICT is not only a supportive factor in improving institutional performance, but also a driving factor in process re-engineering in social security institutions as a result of short-cycle innovations. In addition, ICT allows integrated information distribution related either to one specific or to all institutions of a social security system. With a best practice ICT system in place, social security institutions are able to deliver high-quality and more efficient services to their customers.

IT supports the business processes of employment and pension institutions and, at the same time, offers the opportunity to re-engineer them, thus developing highly effective process- and service-oriented social protection administrations. Government institutions increasingly use IT to deliver programs in social risk management. From the technological perspective, multiple processes of labor, pension, and social welfare systems can be automated and moved online. Also, the very short innovation cycles of IT result in a higher frequency of available new solutions. However, social protection agencies operate with limited budgets, and therefore must consider the cost-benefit perspective whenever they invest in major IT projects.

Australia: Centerlink, statutory authority responsible to the Ministry for Social Security

Centerlink has integrated customer services previously provided by several departments (the Department of Social Security, the Department of Family and Community Services, the Department of Education, Training and Youth Affairs, and the Department of Health and Family Services) including:

- child care and student assistance;
- registration of applicants for supplementary income;
- self-help job search facilities with computer access to national databases;
- referrals for employment; and
- specialist labor market assistance for disadvantaged groups, such as Aboriginals, Torre Strait Islanders, single parents, people with disabilities, migrants, and young people.

Centerlink Online provides integrated services round the clock on the basis of available technology, through street kiosks, Internet cafés, or community centers, as well as Smart Card and interactive voice systems.

Canada: Human Resources Development Canada (HRDC)

HRDC is responsible for delivering social services including programs such as employment insurance, the Canada Pension Plan and Student Loans. Electronic services provided via various channels include e-mail, telephone service, Internet access, electronic employment insurance claims filing; pension application forms filing, as well as pension payments via direct deposit to bank accounts; job bank application submittal via the Internet; payment status information via the interactive voice response system.

Italy: Information and Services for the Public (Pubblincontrollo)

Pubblincontrollo facilitates direct communication between citizens and the Italian Public Administration through a network of self-service kiosks.

Client-server architecture with a public network provides general information in real time through free access, use of password, or magnetic fiscal card. The facilities include general information (documents, deadlines, office hours); personal files (benefits, contribution certificates, contributions history); setting up meetings or medical appointments; notification of changes in personal data; and application for benefits.

Poland: Employment Promotion and Services Project

Part of the project was the automation of some 400 local labor offices and more than 2,500 social welfare offices. The offices are equipped with modern hardware and telecommunication infrastructure. A uniform software application for both the labor and the social welfare offices supports operations and management activities, such as registration, benefits calculation, payment, job placement, and cost reporting.

Under this project, a pilot MIS implementation in the Poznan region established a network on the basis of fiber optical technology, linking labor offices with other institutions such as Social Insurance Institution, and fiscal offices. This allows data screening of the unemployed and contributors in order to detect and prevent fraud.

ANNEX 5

WORLD BANK SPECIAL INITIATIVES IN INFORMATION AND COMMUNICATION TECHNOLOGIES

In addition to its standard operations in the II and education sectors, the World Bank Group has established a number of special knowledge initiatives seeking to create, share and apply knowledge with our clients, partners, and the outside world.

The global knowledge programs fall into two broad categories. The first is a set of programs focused primarily on education, and directed toward capacity building in developing countries. These programs focus on developing skills in the use of ICT. The second set of programs focuses on the sharing of knowledge resources within the development community and with

different stakeholders, to ensure both a concerted approach to development as well as the application of knowledge for poverty-alleviation.

Human capacity building

The World Links for Development (WorLD) is a global collaborative learning program sponsored by the World Bank Institute, in coordination with the World Links Organization. The program connects students and teachers in secondary schools in developing countries with their counterparts in industrialized countries, for collaborative learning programs through e-mail and

The Development Gateway Foundation and *infoDev*

infoDev was created in 1995 as a multidonor grant facility to support innovative uses of ICT in developing countries. The program currently engages 23 public and private donors including the World Bank, and its Secretariat is hosted by GICT. *infoDev* receives proposals from governments, private firms, civil society organizations, and other multilateral organizations, and evaluates them on a competitive basis, providing grants of up to \$250,000 per project.

Over the years, *infoDev* has established itself as a venture fund for innovative ICT ideas addressing the needs of the poor in the developing world. *infoDev* has also served as the funding mechanism for quick strike policy-oriented interventions in special circumstances such as the Y2K problem and telecom negotiations under the WTO.

The Development Gateway Foundation became operational in 2001, and will pursue the following objectives:

- Support sustainable development and poverty reduction through the creation of a common Internet platform (the Development Gateway portal), in partnership with the donor community, governments, the private sector, civil society organizations, and other key development actors.
- Create a knowledge resource that will catalogue, organize, and monitor initiatives intended to diminish the digital divide, and provide a forum for discussions intended to promote partnerships and synergies between civil society and the public and private sectors on key ICT issues. The Foundation will also promote the development of an active network of experts on ICT for development, training staff from partners to strengthen their capacity for delivering projects in this area.
- Establish a research and training center in the developing world, where ideas can be exchanged and new technologies can be tested on the ground.

The Development Gateway Foundation is also expected to provide seed funding for selected projects and programs at the local, national, regional, and global levels that are working to overcome the digital divide, and to foster the use of ICT to enhance the fight against poverty. Donors to the Development Gateway Foundation may, for example, earmark part of their contributions to support projects selected by *infoDev*. The Foundation will outsource to *infoDev* (on a fee-for-service basis) the evaluation of proposals.

infoDev and the Development Gateway Foundation will maintain independent governance structures—*infoDev* as a network of trust funds managed by the World Bank, and the Foundation as an independent not-for-profit organization in which the World Bank will be one among many partners. They will focus on different types of activities—the Foundation on the management of larger ICT projects, and *infoDev* (as it currently does) on small-scale pilot projects managed at arm's length from the program and/or policy-oriented interventions. But the two initiatives will work together in a complementary way to address the digital divide.

the Internet. As a complement to WorLD, WBI's Development Education Program provides curriculum tools and resources for teachers and students to explore social, economic, as well as environmental issues of sustainable development.

The African Virtual University (AVU) is a "university without walls" that uses modern ICT to give sub-Saharan African countries increased access to high quality education and learning resources from all over

the world. Since the launch of its pilot phase in 1997, AVU has provided students and professionals in 15 African countries over 2,500 hours of interactive instruction in English and French. More than 12,000 students have completed semester-long courses in engineering and the sciences, and over 20,000 professionals have attended management seminars on topics such as strategy and innovation, leadership, and use of IT. After its successful pilot implementation,

Overview of Bank Group Special Knowledge Initiatives

Program	Description	Budget costs* Bank budget (\$)	Other contributions (\$)	Expenditure on projects (\$)
<i>Education</i>				
African Virtual University	Delivers courses by satellite to 26 African universities, with real-time interaction by email, fax, and phone.	750,000	13,500,000	1,500,000
Global Development Learning Network	As of January 31, 2001, operates 22 learning centers in least developed countries connected by high-speed communications.	6,990,000 ^b	15,000,000	3,350,000
WorldLinks for Development	Promotes educational use of Internet in 500 schools in 20 countries with donor funding.	1,240,000	400,000	NA
<i>Knowledge sharing</i>				
Development Forum	An electronic discussion venue on key issues and challenges facing the development community.	200,000	TBD	NA
Development Gateway	An interactive web portal on a wide range of development issues to be linked to country gateways for each developing country.	7,000,000	200,000	2,000,000
Global Development Network	Seven regional networks of research institutes, policy makers and donors to encourage research on critical development topics.	1,200,000 ^d	600,000 ^e	8,000,000
Global Knowledge Partnership	An evolving, informal collaboration of about 40 public, private, and NGO partners working to promote knowledge for development.	100,000 ^f	245,000	NA
<i>GICT/infoDev</i>				
	Global grant program promoting innovation in the use of ICTs for social and economic development.	200,000	1,600,000	10,700,000

* Estimates based on information provided in late 2000 to the Knowledge Strategy Review for FY01 budget, updated February 2001.

a Total costs 2000-4 divided by 5.

b Total administration budget.

c \$1M capex + \$0.45M annual opex each, assuming 25 set up the same year.

d \$1M + 1 staff year (estimated at \$200K).

e \$8.5M cash plus estimated cost of 2 economists (@\$100K each), admin assistant and 5 scholarships (@\$50K each).

f \$55K + 15 SW (@\$3K each).

AVU has now been established as an independent not-for-profit organization in Nairobi, Kenya with supporting offices in Washington, DC.

The Global Development Learning Network (GDLN) is a telecommunication network that connects distance-learning centers in cities around the world that are used to provide training and education resources for policy makers and professionals. Linked through a web of high-speed communication technologies, GDLN members are part of a worldwide exchange of learning activities, including courses, seminars, and discussions on key development issues. The learning center includes high-speed access to the Internet and a fully equipped multimedia learning room with computer workstations, and provides videoconferencing services.

Knowledge sharing

The Global Development Network (GDN) fosters collaborative efforts among research institutes, policy makers, and donors to encourage capacity building and networking. GDN supports capacity building for research through the Regional Research Competitions, which have disbursed \$10 million through peer-reviewed competitions over the last three years, and the Global Development Awards, which are emerging as the premier prize for research on development. It also supports networking through GDnet, an interactive web strategy linking the regional networks and hubs in Europe, Japan, and North America to create a truly global association.

The Global Knowledge Partnership (GKP) is an evolving, informal partnership of public, private and not-for-profit organizations for sharing information, experiences, and resources to promote broad access to,

and effective use of knowledge and information as tools of development. The GKP emerged from the Global Knowledge conference, "Knowledge for Development in the Information Age," in Toronto, Canada in June 1997. Members of the partnership cooperate through a variety of initiatives—pilot projects, conferences and workshops, capacity building initiatives, information sharing, and project coordination.

The Development Gateway Foundation, is a response to the demand for programs on the ground, and for support for knowledge sharing, networking, and capacity building. It will support both research in the ICT area and e-learning, and action in the field. The Development Gateway portal, a central program of the Development Gateway Foundation, aims to establish partnerships with private, public, and civil society organizations to build a common space for dialogue and sharing of knowledge and ideas. The Gateway portal also supports the creation of Country Gateways, locally owned and managed by partners of the project, to foster the availability of development information at the local level.

The OED/OEG report suggests that a process of streamlining might be needed, based on a systematic evaluation of relevance, impact and efficiency. A review of the World Bank Group's knowledge work, including these initiatives, is currently being led by the office of the MD for Human Development. The review aims to better identify the scope, interrelationships, and value of the various elements of the "Knowledge Bank", and to develop a single strategic framework for the World Bank Group's knowledge work. The review will be completed during the second quarter of FY02.

ANNEX 6

KNOWLEDGE DEVELOPMENT AND DISSEMINATION

As part of delivering its new strategy in the ICT sector, the World Bank Group will develop a series of databases and knowledge resources on topics and issues crucial to its agenda in this sector. These knowledge resources will be delivered to public and private sector clients, partners, and other stakeholders. The knowledge resources will be important to the World Bank Group's operations, as well as provide crucial resources to clients.

Advisory and technical support to governments to create the conditions for a knowledge economy—in terms of policies, regulations, capacities, and infrastructure—have become one of the most significant product lines of the World Bank Group. Building and disseminating important knowledge resources is crucial to such an exercise. Providing knowledge products and services will enhance and support the World Bank Group's strategic interventions. It will also accelerate the development of the sector in client countries by supporting better policies across regions, and larger investment flows in frontier countries and markets. It will increase operational effectiveness by offering rapid access to a comprehensive repository of sector and industry knowledge and background information necessary to sustain and expand operations in the sector. The value added of this service will come from:

- Knowledge that is clearly targeted to the main pillars of the World Bank Group's agenda: creating an enabling policy environment; instituting broad cross-sectoral reform for transition to a knowledge economy; deploying ICT for poverty alleviation; extending rural access; supporting investment in frontier markets and regions; and supporting social and sectoral applications of ICTs.
- Knowledge that derives from the World Bank Group's unique position and comparative advantage (firsthand knowledge of country conditions, global experience), and hence is not easily available elsewhere.
- Packaging information and documentation with analysis, so as to provide a comprehensive and in-depth understanding of country conditions and sector development.

This will be targeted toward both private sector

partners, as well as telecommunication policy makers in client countries. There is increasing need, and often expressed demand in developing countries for assistance in dealing with issues of the new economy and of rapid changes in the ICT sector. The World Bank's thrust on policy advice is in response to this need, and developing knowledge resources is key to this response. Additionally, knowledge about investment opportunities will play a catalytic role in directing private investment to areas that are particularly relevant to the World Bank Group's developmental agenda. Private sources of market information do not fulfill this key need.

Country assessments/action plans

These will essentially be summary documents about the status of the country's II, e-readiness assessments, and national plans. Efforts to scale up this kind of background knowledge exercises is crucial to delivering clear, coherent strategies in the sector at the country level, as the World Bank's agenda becomes increasingly focused on enabling countries to come to grips with various facets of the knowledge economy. It will be important to share these assessments online to provide benchmarks to other countries. To the country and regional managers of the World Bank, this will provide a means of determining where their respective countries are falling behind, and where intervention can be most effective.

ICT policy and regulatory database

This will be a comprehensive repository of information on policy, legal and regulatory structures, and issues in different countries such as on competition, interconnection, tariffs, and spectrum auctions. It will supplement statistical snapshots and matrices of regulatory data and legal documents (provided at present largely by ITU), to include a compendium of analytical pieces, progress updates, historical experiences on policy reform, best and worst practices, and what works for successful private investment and investor confidence and what doesn't—all issues on which the World Bank has unique knowledge and firsthand experience. To a potential investor, this will provide a comprehensive picture about the investment climate, and the World

Bank Group's support to that country. To a policy maker, it will provide a means of comparing experiences, important lessons, and best practices about policy reform.

Resources such as standard agreements for inter-connection arrangements, will be made available to aid regulators and policy makers. This will be new content only to the extent that these resources are not already available on other websites, primarily that of the ITU. In other cases, links will be provided. Similarly, technical papers on issues such as intellectual property rights, data security, etc. will be provided, again selectively, and geared to policy makers and regulators.

This will be supplemented with information and analysis on Internet content laws related to intellectual property rights, privacy, security, and digital signatures, as well as laws related to the market structure in the Internet and broadcasting fields—for instance laws related to competition in the ISP markets, legal restraints on Internet telephony, broadcasting laws, and convergence issues. As with telecommunication policy, this too will be supplemented with analytical resources.

ICT markets

This database will identify and provide access to information on opportunities in frontier markets and regions that have potentially lucrative investment opportunities, but might be outside the commercial sector's radar. It will also provide information on tenders in the ICT sector for privatization, issue of licenses in different market segments, etc., especially in frontier markets and regions.

The database will reflect the structure of the ICT market in developing countries and the players in different segments of the ICT sector—telecom equipment and service providers, ISPs, ASPs, IT hardware suppliers, software solutions companies, etc. This will also be a means of matchmaking developing country firms with developed country partners and source of finance.

It will also provide important knowledge resources on rural telecom expansion—technical information about private options for rural infrastructure delivery, and best practice case studies.

In rural areas, there is a need for identifying investment opportunities that might be attractive to the private sector, and demonstrate the commercial viability of some rural operations. Rural demand figures might help identify where there are possible opportunities. Therefore, the database should also include a

list of resources on various means of providing rural access to ICT, and information on subsidies.

Learning resources

The website for the databases can also be a tool for distance learning in the sector. The courses for both internal and external clients will be put online to the extent feasible.

Implementation and resource implications

Developing the knowledge resources will entail extensive knowledge collection, management, and packaging, selecting the best analytical sources, combined with analysis of relevant information.

The World Bank Group has significant presence and close familiarity with developing countries, and access to significant sources of information. Content partnerships will be inculcated with both external and internal partners. Key internal content partnerships will be explored with PSD, MIGA, and WBI, and special initiatives in the ICT arena, such as WorldLinks, Africa Connection, GDLN, GKP, and AVU. External partnerships will be with agencies such as the ITU, as well as with ICT-related agencies in the client countries. Content partnerships with private sector partners such as the Economist Intelligence Unit, as well as with other content providers on the Internet will also have to be considered, to provide primary as well as analytical data, but the parameters of these partnerships, as well as the benefits accruing to both parties, will need to be worked out clearly.

Dissemination will be done over the Internet, through either a stand-alone website, or, in the initial phases, through GICT's external website. Through internal knowledge management, links may also be provided to databases of select documents that can be made publicly available.

Scaling up GICT's knowledge services has significant resource implications. Resources from the VPs (a combination of regional and PSI VPs for Policy and Investments), from Trust Fund sources, as well as from *infoDev* will be solicited in the initial stages of the project. The initial scope of the exercise will be limited, based on the availability of internal and Trust Fund financial support. In the later stage, however, based on response, needs, and demand, this could be developed as a separate business line that is financially sustainable, with costs covered through fee-based services, sponsorships, and limited advertising. Some components of this service could also be fed into the II section of the Global Development Gateway, which is a portal for connecting to various resources on the web.

ANNEX 7

WORLD BANK GROUP INSTRUMENTS

The OED/OEG review emphasized that the World Bank Group needs to use the full array of instruments available to it to support the development of the ICT sector in its client countries.

IFC instruments

Loans and guarantees

- Preprivatization support will be used to ensure improved services from the privatization of state-owned incumbent operators. A past example of this type of operation was the \$25 million FYR Macedonia Telecommunication Company loan to support service quality and rollout before privatization.

Equity, quasi-equity and other financial products

- Since IFC has initiated investments into the Internet sector, given the pre-IPO nature of a number of Internet investments, quasi-equity financing, IFC intermediary services, and venture capital funds will be particularly important.

Special funds

- IFC's SoftBank investment has created a Global Private Equity Fund focused on Internet businesses in developing countries.
- The appropriateness of other such funds will be determined, for example, to support the rollout of rural telecommunication.

World Bank instruments

World Bank investment loans—specific investment loans (SILs), APLs, LILs, and technical assistance loans (TALs)—are most widely employed for investment to develop the sector, to test new development models, and for organizational capacity building. They will be deployed for extending rural and universal access, postal investments, and for ICT components of sectoral investment loans. In some instances, investment might be necessary in the postal sector, in which case investment loans could also be deployed for this purpose.

Adjustment loans will be used to complete the telecommunication reform process, to initiate and complete reform in the postal and broadcasting sectors, and also to initiate larger knowledge economy agendas, cutting across different sectors.

Specific investment loan (SIL)

- SILs will continue to be used for supporting sectoral applications of ICT within broader sectoral loans.
- While the World Bank Group has moved away from infrastructure investments through state-owned enterprises, investments from rural access will be considered when channeled through a onetime subsidy scheme, special rural infrastructure funds, and other public-private mechanisms for setting up rural community telecenters.
- In some instances, investments will also be made in postal sector reform.
- SILs might also include other components, including TA. The Dominican Republic Telecommunication Regulatory Reform Project is an example of a SIL with a telecommunication focus, which includes funds for TA, equipment, and severance payments related to the creation of an independent telecommunication regulatory body.

Adaptable program loan (APL)

- APLs will be useful instruments for investment in both ICT components of sectoral projects and for rural access, because many of these projects are new; they are mostly untested; and their efficacy and efficient implementation models would need to be demonstrated. An example of an APL with an IT component is the Turkey Basic Education Loan, supporting *inter alia*, provision of computer hardware and software to over 5,000 Turkish schools.

Learning and innovation loan (LIL)

- LILs will be used to pilot new initiatives including innovative techniques of financing rural access to ICT.
- LILs will also be widely used to pilot the use of ICT in various sectoral applications including health and education.

Technical assistance loan (TAL)

- TALs, especially multisectoral TALs, have been widely deployed for telecommunication reform and to build institutional capacity in the regulator and

the ministry. They will continue to be a major tool for the support of ICT regulatory reform programs and capacity building for regulators in telecommunication, posts, and broadcasting. An example of a past TAL was the OECS Telecommunication Reform Project supporting ICT sector reform in the Eastern Caribbean and the creation of a regional regulatory authority.

Structural adjustment loan (SAL)

- SALs have been used for multisector use, public sector reform, and privatization with telecommunication as a component. When stand-alone telecommunication reform projects are not feasible, SALs will continue to be deployed for this purpose.

Sector adjustment loans (SECALs)

- The scope of SECALs can be extended to cover convergence and new economy issues, such as ISP market regulation and e-commerce legislation. An example of an ICT SECAL is the Morocco Telecommunication, Post, and Information Technology Sector Adjustment Loan project, which supports legal and regulatory reform across the ICT sector, as well as licensing competitive new entrants in key market segments.

Poverty reduction strategy credits (PRSC)

- In countries where ICT is identified as a key component of the national poverty reduction strategy, financing for ICT could be included in the PRSC. This source of funding will be most appropriate for activities with a strong poverty reduction focus, such as universal access initiatives.

MIGA guarantees

- Political risk guarantees will continue to be used to support private investment in telecommunication and the Internet. An example of a MIGA issued guarantee is that to a number of companies supporting investments in Azercell Telecom MMM (Azercell) to expand its digital cellular telecommunication capabilities in Azerbaijan.

Grants and trust funds

- *infoDev*: *infoDev* grants will continue to finance innovative ICT applications projects, for creating an enabling environment for ICT, reducing poverty and economic exclusion, promoting education, health, and environmental sustainability, improving the efficiency and transparency of governments, and conducting e-readiness assessments. Scalability and replicability will be important criteria. The grants will continue to support research and the

development of best practice in the sector, promote dialogue and coordination, and fund pilot projects in both the public and private sectors covering a range of applications.

- *Public-private infrastructure advisory facility (PPIAF)*: PPIAF grants will support limited technical assistance for all stages of the reform process in developing countries, research on the impact of reform, and the development of best practices for the regulation of privately provided ICT services.
- *Trust funds*: Trust funds will provide small-scale TA, for example, for the design of legislation, research, and ICT assessments. The Japanese government's Policy and Human Resources Development program, which now has a focus on IT and innovative applications, will be one source of funding.
- *Project development facilities*: IFC expertise in supporting SMEs will be used to assist developing country Internet start-ups and niche providers of ICT services, in carrying out feasibility studies and preparing sound, viable business plans.
- *Technical Assistance Trust Fund (TATF) and Privatization Advisory Services (PAS)*: TATF resources will be used to support TA for the public and private sector development of business plans, private sector pilot operations, and training programs, privatization advisory services, and legal and regulatory support. PAS will be used to hire consultants to support the privatization of government telecommunication operations.
- *Paid advisory services*: Paid advisory services for creating policy and regulatory structures to support the development of ICT markets will also be offered to countries on demand (GICT is already working with Kuwait and Saudi Arabia in this capacity). Advisory services will focus on legal and institutional mechanisms necessary to invite foreign investment into the ICT sector and to foster domestic entrepreneurship.
- *Project preparation facilities (PPF)*: PPFs will support the design of initial sector reform, or larger investment projects in small countries eligible for International Development Association (IDA) lending.

Core funding

- *Development Economics (DEC) and World Bank Institute (WBI)*: DEC and WBI will have leadership roles in research and best practice studies, dissemination, and learning initiatives for developing country policy makers, covering the knowledge economy, telecommunication sector regulation and policy, e-commerce and e-government, ICT access, and development impact.

Special Initiatives

- Special initiatives such as WorldLinks and the Global Development Gateway will support pilot projects, research programs, learning initiatives, and dissemination covering ICT and applications.

ANNEX 8

PROPOSED TRAINING COURSES

In order to respond effectively to the challenges of the new economy, staff from across the World Bank Group will need to be trained in an array of skills necessary to the digital economy, covering courses on e-government, education, infrastructure, and e-commerce. These courses are recommended as part of the business strategy for GICT staff but could be similarly

provided to staff outside of GICT (excepting those on infrastructure). Course areas include e-government, education, infrastructure, and e-commerce as described below.

For the many ICT specialist staff outside of GICT, currently hosted in some regions, and possibly expanding in the sector groups as ICT components increase

E-government	<p>Web hosting, ISPs, ASPs, integrators, outsourcing (infrastructure and S&M issues) Costs of deployments and ownership of websites. Level of sophistication of web access/transaction Security and authentication issues Back-end issues: Data warehousing, enterprise resource planning, managing the supply-chain of applications Decentralization of governments and the consequence on distributed systems, and type of architecture and infrastructure needed Databases development and management Learn more on applications and best practices available for:</p> <ul style="list-style-type: none"> ◦ Tax filing/payments/returns (for IRS, Customs or Ministry of Finance) ◦ Property registration (land, commercial properties, movable assets, etc.) ◦ General accounting packages for commercial and central banks ◦ Electronic payment systems ◦ Biometrics ◦ Connectivity of government agencies ◦ Unified budget systems ◦ E-voting ◦ News and information to/from citizens ◦ Decentralization of e-government applications to local/municipal level for content ◦ Case studies
Education	<p>Distance education techniques, tools, and packages Infrastructure prerequisites Content creation, distribution, and delivery models of distance Learning Streaming and advanced techniques Intellectual property rights, copyrights laws, and best practices for multimedia content Major players</p>
Infrastructure	<p>Connectivity basics: Internet protocol, media, bandwidth, broadband, etc. Wireless connectivity and applications (e.g. rural access) Main players/vendors in wireless telecommunication provision Models for telecenter—basic infrastructure needed, costs, maintenance, content development VSAT basics Business models for ISPs, ASPs and integrators</p>
E-commerce	<p>Step by step guide to all elements needed:</p> <ul style="list-style-type: none"> ◦ Legal implications: Which laws are required to be amended/created. ◦ Commercial implications: Tariffs, taxes, etc. ◦ Enabling infrastructure: Transport, postal, etc. ◦ Case studies of e-commerce in developing countries. ◦ Global regulation environment: WTO, United Nations Conference on Trade and Development, ITU, etc.

in importance and quantity in the World Bank's lending portfolio, courses would range from basic or advanced knowledge of the technical fundamentals of ICT, training in the emerging e-commerce scenario, skills development in the application of ICT to various other sectors, and laws and regulations related to technological and business aspects of the new econo-

my, where in-depth treatment of the courses market for GICT staff may not be possible due to time and/or budget constraints. Also, a critical skill to build is the vertical ICT expertise, needed for sectoral applications in public sector management, health, education, etc. A brief description of some shorter courses that the staff could be trained in follows.

Course and Content	Audience
<p>Basic ICT: Three day overview of IT, networks, telecommunication, Internet, e-economy issues (Model: "E-networks for Professionals" by Learning Tree).</p>	<p>World Bank Group staff working on ICT investments, projects, and components.</p>
<p>Telecommunication Fundamentals: Two day overview of the technology and operation of telecommunication, the Internet, broadband, video, wireless and ATM networks (Model: "Telecommunication Fundamentals" by Globalknowledge.com).</p>	<p>World Bank Group professionals working on II projects.</p>
<p>Broadband and Wireless: Two day refresher/update course with updates on latest applications and technology.</p>	<p>World Bank Group staff working on II projects.</p>
<p>E-commerce: Two day overview of e-commerce concepts, legislation, regulation, privacy issues, security, taxation, the broader enabling environment, and available products and services.</p>	<p>World Bank Group staff working on II, ICT sector, or macroeconomy projects.</p>
<p>E-government: Two day discussion of e-government applications, coordination issues, best practices, and case studies.</p>	<p>World bank Group staff working on public sector management projects and governance issues.</p>
<p>ICT Training for World Bank Group Managers: One day customized course as part of the electronic data processing program to review fundamentals, development impact, and priorities in the ICT sector.</p>	<p>Bank Country Directors, Sector Leaders, Network Heads, VPs.</p>
<p>Vertical applications on health care systems, financial management, accounting systems, payment systems taxations and customs, education and e-learning, human resource management, GIS, Social Security, e-government, e-commerce, etc.: Courses to be offered by the industry, whenever possible, BBLs, sharing best practices, World Bank-funded research through thematic groups, communities of ICT practice retreats, etc.</p>	<p>All ICT specialists currently in regions (ECA, LAC, Africa), and for the possible additional resources needed in the networks (ESSD, HD, PREM and FPSI).</p>

ANNEX 9

INFORMATION AND COMMUNICATION TECHNOLOGIES MONITORING AND EVALUATION INDICATORS

Monitoring and evaluation of ICT operations is important and can be improved, particularly in currently undercovered areas:

- at the project and activity level for multisector and advisory work; and
- for IFC projects (to set targets related to particular development impact objectives).

Monitoring and evaluation of project outcomes will primarily involve tracking changes in various measures of sector development against predetermined targets and comparator countries. This is already the case in the majority of stand-alone II projects on the World Bank side.

Quantitative sector indicators tend to be chosen from a list covering areas such as those given below (with examples of indicators):

- *Overall sector development:* telephones (fixed, mobile), Internet hosts or users, Internet traffic, radios, computers, e-commerce, postal use, all on a per capita basis.
- *Extent of competition:* number of operators, and the market share of the largest ones, in main ICT market segments.
- *Access for the excluded:* telephone/Internet/postal/broadcast access among the poorest, access in rural areas, and the percentage of land area/population with access.
- *Cost and quality of service:* cost of local/international calls, ISP service, and high-bandwidth connectivity; waiting time for a phone line; and the percentage of calls completed successfully.
- *Quality of content:* size and number of local language websites, and frequency of hits.
- *Availability of skills:* number of students given Internet-based instruction.

For some projects, especially those that aim to improve knowledge provision or reform sectors, the quantitative measures of sector progress should be complemented with *qualitative estimates*:

- *Status of reform:* movement toward a well-regulated, competitive environment in the sector with strong provision for universal access, and extent of privatization.
- *E-readiness:* passage of an appropriate package of e-commerce enabling legislation, financial reforms

for Internet-based transactions, and improvements in service delivery.

- *Improvements in entrepreneurial environment:* more businesspeople ready to make use of the opportunities presented by the new technology.
- *Quality of content:* content sites that overcome market barriers and are particularly suitable for developing nations.
- *Improvements in knowledge:* Well-disseminated studies and reports, with focus on developing economies, on best practices in telecommunications/Internet/postal/broadcast areas.

Additional monitoring indicators may, depending on project scope, link to the World Bank Group's broader PSD, growth, and living standards measures. For some projects expected to involve large transactions (such as privatization of the state monopoly) the World Bank Group will set macro targets. For others aimed at improving rural access, the World Bank Group will measure income and nonincome impacts of the access. However, it is difficult to clearly establish the link between project outcome and development impact. Therefore, macro, income, or quality of life indicators should be chosen

- on a case-by-case basis,
- only in large projects where the impact is expected to be significant, and
- only where resources have been dedicated at the outset to carry out such an evaluation.

Some of the above monitoring indicators (ISP costs, percentage of population with postal access for example) are not easily available at the country level, especially not in an internationally comparable format. For the indicators to have contextual meaning for individual projects, this would need to change. It would require at the least a project-specific approach, to collect data both in the project host country and a range of comparator countries at the time of project implementation.

This would involve the inclusion of support in the project agreements for gathering suitable project monitoring data that are not already available. A more general effort to collect such data across our client countries, and in a globally consistent way, would likely be more efficient and provide a global public good.

However, factors like budget realities might very well push against this.

More detailed impact evaluations and studies, including lessons for future projects, will remain under the purview of OED/OEG. Given the rapidly changing and expanding nature of the sector, the priority of evaluations of ICT projects will be increased, and a sector review will be carried out in FY05.

NOTES

1. Some limited public funding may be warranted to restructure the incumbent along business lines (e.g. by separating basic telecommunications services from other activities), restructure its balance sheet, or reduce surplus labor. In this context, IFC preprivatization loans have proven effective instruments (see below section on World Bank Group investment in the IT sector).

2. Priority in supporting access schemes will often go to basic services. Indeed, (a) access to basic information infrastructure services, including broadcast technologies, may be more easily achieved than access to advanced services (such as the Internet); (b) basic services are more relevant to poverty reduction as they can be more easily used by the excluded, including the very poor and the illiterate; and (c) basic services have a strong record in promoting development objectives.

3. This paragraph deals only with World Bank Group investments in public entities providing public network infrastructure or services. It does not deal with funding of (a) the subsidy element in output-based aid schemes (discussed above in the section on access); (b) "private" or "closed" networks owned by public entities (such as administration intranets); or (c) equipment that may be needed for regulatory purposes (such as frequency monitoring and management equipment); nor does it modify existing World Bank guidance regarding the financing of severance pay in public enterprise reform operations.

4. See the *UNCITRAL Model Law on Electronic Commerce*, 1998; and the *UNCITRAL Model Law on Electronic Signatures*, 2000.

5. See the WIPO Convention and the TRIPS Agreement.

6. To encourage network use, existing operators can set up schemes to part finance diverse retail activities. The prerequisite, however, is that the regulatory regime must not prohibit reselling of services. The traditional approach is to franchise a telephone line to private individuals or small businesses and to pay a percentage commission to the franchisee. Small loans may be granted to set up operation or to enhance services to include fax services for example. Micro loans can also be used to finance phone shop and small telecenter operators to expand from basic telephone and fax into the Internet and ICT arena, as the market potential permits.

7. Wellenius, B., "Extending Telecommunications Service to Rural Areas – The Chilean Experience," World Bank Public Policy for the Private Sector Note No 105, Washington, D.C., 1997.

8. For convenience, the term "electronic commerce or e-commerce" is used in this paper to denote the business-to-consumer and business-to-business electronic commerce activity. The term "electronic

procurement or e-procurement" is used to denote only the electronic procurement activity of governments (or B to G e-commerce).

9. <http://compranet.gob.mx>

10. A draft strategy paper has been prepared by OCSPP, the ideas of which are reflected here.

11. The agreement, based on a technical review of Compranet done by the World Bank in July, 2000, provides for mutually agreed standards of quality, accessibility, reliability, security, and transparency for the operation of Compranet in a manner consistent with World Bank procurement guidelines.

12. Close, Humphreys, and Ruttenbur, SunTrust Equitable Securities, March 2000.

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14. Report from G-7 Finance Ministers to the Heads of State and Government, "Impact of the IT Revolution on the Economy and Finance," Fukuoka, July 8, 2000.

15. From M. Hazan, *infoDEV/IICD Stories Database*.

16. ISU (International Space University). "Telemedicine in the 21st Century: Opportunities for Citizens, Society and Industry: An International Space University Workshop," Hilton Hotel, Strasbourg, France, 4–5 November, 1999.

17. Outcomes of the Women's Forum Action Plan, Kuala Lumpur, March 2000, a conference organized by the Global Knowledge Partnership, an informal coalition of intergovernmental and development organizations, governments, businesses, and NGOs, together with the Government of Malaysia.

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19. ITU, "Rural Telecommunications in Colombia—Lessons Learned." World Telecommunications Development Conference (WTDC-98), Valletta, Malta, 23 March –1 April, 1998.

20. For more information on telecenters in Senegal, see http://www.idrc.ca/acacia/engine/eng_6.htm; <http://www.telecom-plus.sn/observatoire/Obtcp.htm>; and <http://www.sonatel.sn/c-telece.htm>.

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23. Vijayaditya, N., "A Wired Village: The Warana Experiment," in S. Bhatnagar and R. Schware (eds.), *Information and Communication Technology in Rural Development*, World Bank Institute, 2000.

24. Dasgupta, S., H. Wang, and D. Wheeler, "Surviving Success: Policy Reform and the Future of Industrial Pollution in China," World Bank, Development Research

Group Working Paper No. 1856, November, 1997.

25. For a detailed discussion of technology, input prices and pollution, see World Bank (1999).

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28. For a description and analysis of the Indonesian program, see S. Afsah, and J. Vincent, "Putting Pressure on Polluters: Indonesia's PROPER Program," A Case Study for the HIID 1997 Asia Environmental Economics Policy Seminar, Harvard Institute for International Development, March, 1997.

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THE WORLD BANK GROUP
1818 H Street, NW
Washington, DC 20433 USA
Telephone: 202 473-1000
Facsimile: 202 477-6391
Internet: www.worldbank.org
E-mail: feedback@worldbank.org



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