

The Intelligent Cities Project Report

The Challenges and Opportunities for Sub-national Governments in the Global Information Economy

Global Affairs Institute, Syracuse University: Terrell A. Northrup, Angelo Rivero Santos, Stuart J. Thorson

Institute for Electronic Government, IBM: Janet Caldow

The Global Affairs Institute (GAI) of the Maxwell School of Citizenship and Public Affairs was created in 1993 to integrate and focus the School's research, training, and service activities in areas of international studies. GAI builds upon the Maxwell School tradition of producing a community of citizens, broadly schooled and skilled, whose signature is civility and civic-mindedness on a global scale. GAI's central mission is to help prepare this and future generations of students, concerned citizens, scholars, public officials, and other professionals to address the opportunities and challenges presented by an increasingly interdependent world of diverse cultures, economies, and political systems. GAI's Global Collaboratory, an interactive classroom equipped with satellite links for international broadcasts and teleconferencing, provides the technological tools to promote global awareness at GAI, the Maxwell School, and beyond.

IBM's Institute for Electronic Government is a resource for government leaders to explore, understand, and develop new insights and strategies for dealing with today's Information Age. Through its innovative programs, the Institute provides a forum for elected officials, administrators and government managers to gain knowledge and practical experience in information technology leadership issues. Research topics are designed to produce working models to better prepare government leaders to address information strategy development, improve government effectiveness, deliver better services to citizens, address associated public policy issues, and realize competitive economic advantage in the emerging electronic commerce arena.

Acknowledgments

The Global Affairs Institute of the Maxwell School of Citizenship and Public Affairs of Syracuse University acknowledges the International Business Machines Corporation's (IBM) Institute for Electronic Government and its Director, Janet Caldow, for her contribution to the report and the opportunity to engage in this collaborative research effort. Special recognition is also extended to IBM's worldwide government management team, Ken Thornton, Bob Samson, Bob Savage, Victor Almeida, David Morriss, Todd Ramsey, and John Cherbini for their leadership and support.

Executive Summary

This study begins to explore how subnational units of governments—cities, regions, provinces, states, localities—are facing the new challenges and opportunities presented by the rise of the global information economy and the world-wide trend toward devolution of political authority away from national governments.

Many have argued that a new global information economy is replacing the industrial economy which has dominated most of the twentieth century. The global marketplace and its technological infrastructure reflect shifts from manufacturing and distributing physical products to the development of products that are differentiated only by the information that is coupled with them (in fact, often the information is itself the product). Further, these information products are delivered through a combination of advanced digital networks that cannot be contained within geographic borders.

Many governments (like all industries) are struggling with massive internal reengineering in relation to technology to improve efficiencies and deliver government services electronically to citizens. Economic benefits accruing to governments from technology integration have historically been viewed in terms of cost savings and return on investment from specific projects. However, in an exploding information-based economy governments must deal with a complex set of issues including regulation, deregulation, licensing, incentives, and risk management among the constellation of providers and carriers (networks, content, cable, broadcast, wireless voice and data, and telephone). Investment in intense ‘leadership capital’ to address these problems is likely to create an environment that balances competitiveness, investment, innovation and research where electronic commerce can flourish.

The desire for competitive advantage in this new economic model is driving the need for governments to understand, adapt to, and exploit the emerging global information economy. Our research suggests that the successful governance of cities and other subnational jurisdictions will require both sophisticated information technology (IT) strategies and fundamental rethinking of associated public policy. The careful articulation of goals by government leaders seems necessary to the development of successful policies in such areas as regulation, export control, taxation, enforcement of rights and responsibilities, advanced research, standards, security, privacy, ethics, and social processes for adoption and use of IT infrastructure.

In addition, there will be a need for new cross-boundary local, national, regional, and international cooperation to provide an integrated regulatory climate in which information-based economies can flourish. Successful cooperation will depend upon the development and deployment of reliable measures of the economic impact of information technology on subnational government units. To address these issues, we reviewed both theoretical and research literature that deals with governance and information technology. What emerges from our examination is a complex picture:

- Despite the significance of the global information economy, few if any substantiated models exist to identify and measure economic benefits to governments from investment in information technology.
- Governments are, in the literal sense, becoming more virtual. That is, they must in many cases govern without being physically present.
- A growing body of literature addresses information technology in the industrialized West, but very few evaluative studies were found on the impact of information technology in the development process in the developing world, as well as between the developed and developing worlds.*
- The current global changes challenge the conventional wisdom that developing countries must follow the same path to economic development as that experienced by industrialized nations, that is, from agriculture to manufacturing to high-tech services. In fact, there are examples of governments in developing nations that are proceeding in very different ways.
- The diffusion of information and technology has the potential for increasing international tensions when the benefits of the application of technology accrue to one region or government at the expense of others.
- The free flow of information and wide diffusion of information technology across national boundaries have already begun to create new tensions in, for example, the area of intellectual property rights.
- In many ways the new global labor force operates beyond the traditional reach of governmental entities.
- According to the United Nations, the development of national information systems and the capability of handling information are central to economic and social progress, growth and competitiveness, both for the generation of new knowledge and for its application in the process of development.
- Many predict that information technology is likely to change the bases of political power and social class and indeed the world order of thriving economies.

Our findings clearly indicate the need to develop a body of research that will provide new models and frameworks for action in response to information technology and governance. Such models can provide a yardstick for governments as they go through the planning and policy making processes. More specifically, the next research agenda should address the following questions:

- What are the varying social, economic, cultural and political factors affecting the enactment of information policies in both the developing and industrialized worlds?
- What are the leading and best practices in regional and international efforts at policy cooperation and coordination as regions consolidate into economic blocs?
- What are the economic benefits, both short and long term, of investing in information technology in different government sectors, at the national, regional and local levels?
- How should cities and regions throughout the world use information technology to improve performance and reshape the social fabric of the city of the twenty-first century?

- How can leaders develop contextually appropriate technology strategies? At what stage of social and economic development and in what specific political setting are particular issues most critical and what technological steps are most appropriate for a government?
- What is a blueprint of best practices and how can governments move forward in concrete, definitive ways to link transformation strategies with technology strategies?

The Global Affairs Institute and the Institute for Electronic Government will continue their collaborative relationship with the intention of further exploring and delineating models for change.

Overview

"No city should be too large for a man to walk out of in a morning." - Cyril Connolly

Since Roman times—from tribal groupings through medieval city-states to the contemporary nation-state— political authority has been based upon the exercise of control within bounded physical regions. However, for a variety of significant reasons, we are beginning to see changes which are reducing the territorial bases of government.

Many have argued that a new global information economy is replacing the industrial economy which has dominated most of the twentieth century. The global marketplace and its technological infrastructure are in many ways shifting from manufacturing and distributing physical products to the development of products that are differentiated only by the information that is coupled with them (in fact, often the information is itself the product). Further, these information products are delivered through a combination of advanced digital networks that largely ignore geographic borders. The rapid advances in information technology put pressure on governments (and industry) to be responsive more quickly than was necessary in the past. Global information networks are being constructed by a great variety of technologies, all of which are networked in a web of complex interconnections. Powerful, low- cost processors, low-cost memory, digital storage, broadband networks, video, broadcast and cable TV, the Internet, worldwide web applications, wireless communications, hybrid fiber coaxial cable (HFC), and integrated services digital network (ISDN) connections all contribute to the constantly shifting character of the global information highway. Businesses and citizens are demanding better government service delivery through a variety of access devices and systems (phone, TV, PC, kiosk) in the home, office and public places, all of which are interconnected by supporting network services. The rapid pace and shifting directions of technological advancement and deployment creates a kind of “shifting sand” which necessitates new forms of government leadership and cooperation.

The desire for competitive advantage in this new economic environment is driving the need for governments to understand, adapt to, and exploit the emerging global

information economy. Our research suggests that the successful governance of cities and other subnational jurisdictions will increasingly require sophisticated information technology (IT) strategies and fundamental rethinking of associated public policies. The clear articulation of goals by government leaders seems necessary to gain leverage over these technically complex phenomena and to develop successful policies in areas including regulation, export control, taxation, enforcement of rights and responsibilities, advanced research, standards, security, privacy, ethics, and social processes for adoption and use of IT infrastructure. In addition, cooperation across governments is required to create the global infrastructure necessary for the information highway.

Adding to the complexity is the fact that although there is potentially great benefit to be found in cooperation, at the same time national governments are in fierce competition with each other for investment capital and economic development advantages. Further, sub-units of national governments— cities, provinces, states, localities—compete against each other within their parent governments, as well as against other subnational governments worldwide. Juggling these conflicting pressures towards cooperation and competition will require both innovative leadership and informed citizens. In many ways, being responsive to these challenges may involve skills of adaptation more than technical skills, that is, learning how to make sense of the world in such a way to anticipate and rapidly adapt to external change. Solutions to adaptive problems often require fundamental changes in beliefs, structures, behaviors and value systems across an organization. This has, for example, been the basis for the reinventing government movement.

This kind of responsiveness is particularly difficult for city and regional governments that are faced with both the decentralization of information and the need for cross boundary integration in order to deliver value directly to the citizen. Many governments are beginning to recognize both the opportunities and the risks involved and have elevated IT strategy to the executive domain. Prime ministers, governors, mayors, legislators, and political oversight groups are increasingly becoming involved in the decision making process. Some governments have created a center of gravity for IT strategy in the form of Chief Information Officers or steering committees. Governments across all levels, from the national in the case of Singapore to the local in the case of Genesee County in the State of New York in the USA, are acting on the belief that IT will enhance their economic well being and service delivery efficiency to their citizens. Since 1991, Singapore has tapped the practical and visionary expertise of over 200 hundred senior executives from the public and private sectors to see how IT can be pervasively applied to improve business performance and the quality of life. Through its IT2000—A Vision of an Intelligent Island— Singapore continues to prepare itself to meet the challenges of the information age. Most of the western world has its eyes on the island republic, with a diverse array of companies looking for an opportunity to get involved in making Singapore's IT2000 a reality.

As early as 1989, officials in Genesee County, New York, USA, began the task of creating an Information Master Plan to serve the County. Such a plan was designed to serve the “business” functions of the County, develop tools that improve the ability to

make difficult decisions, and to improve services to the public. During the design of the Action Plan for 1990, the County reported that the Department of Social Services was probably the most advanced in the application of IT. Between 1985 and 1990, the Social Services staff had a net reduction of 3 positions and had several clerical positions converted into direct services such as adult protective services and employment training. That resulted in an annual savings of approximately \$75,000 and the avoidance of that much or more in the positions that were converted into direct services.(1)

Singapore and Genesee County exemplify the ways in which governments at all levels are using IT to enhance their economic well being and service delivery to their citizens. In fact, a survey conducted in 1994 of city and county officials throughout the U.S. showed that over 80 percent of respondents felt that the information superhighway would have a positive impact on the efficiency of service delivery in their communities; over 72 percent felt that it would increase citizen involvement; and over 70 percent felt that the information superhighway would have a positive impact on economic development in their communities.(2) However, it appears that very few governments have actually developed a holistic government information technology strategy, public policy reform, and the capability to execute from both a citizen service and economic development perspective. Most efforts have been fragmented at best. For example, the 1994 survey also showed that only 5 percent of responding local governments had a written information plan.(3)

Given this overall environment, it is highly unlikely that cities in the next century will continue to look like those of this century. It is increasingly clear that governments are in the information business and that the successful governors will be those who manage information well and on a global scale. For example, the combination of high speed, high bandwidth and relatively low cost computing and communication, the end of the cold war, and the rise of a global information economy all suggest that physical location will matter less in the twenty-first century than it has in the current one. Indeed, leading edge cities such as London, New York, and Tokyo, like the large multinational corporations, are acting in many ways as independent actors in the emerging global political economy. A city may be part of a nation-state and yet act in many important ways quite independently of that nation-state. For example, officials in Shanghai will negotiate directly with London bankers without any involvement from Beijing.

Factors shaping growing governance demands on cities are likely to include the following: Most legal systems are geographically based. However, the global information economy will be increasingly bit- rather than atom-based. Most of the techniques used by governments are based upon their abilities to exert controls over atom flows. Import tariffs tax movements of physical goods. Health practice regulation is based upon the assumption that health care providers will be near those requiring medical care. Yet advanced communications networks are not contained within simple geographic boundaries, and telemedicine enables medical care to be delivered where the need is, not where the physician is located. The end of the cold war means that the territorial divisions of the world are much less rigid. The rise of the global political economy coupled with

the world-wide trend toward decentralization of political authority from national to local governments means that cities and regions face new challenges and opportunities.

Together these factors suggest that the successful governance of cities and other sub-national regions will increasingly require thoughtful information technology planning and sophisticated deployment and management of information assets. In addition, there will be a need for new local, national and international legislation to provide a regulatory climate in which information-based economies can flourish.

A Case of Global Complexity: Bangalore

The late Secretary of Commerce of the United States, Ron Brown, visited India in January of 1995 to show the Clinton administration's support for India's economic reforms. Such reforms have helped expand Indo- American cooperation to the extent that during his week-long visit, Brown participated in the announcement of more than 25 transactions and alliances between U.S. and Indian companies worth more than \$7 billion.(4) Among the three cities visited by Secretary Brown was Bangalore, the "silicon" capital city of the southern Indian state of Karnataka, which has entered the global economy via its sophisticated high- tech industry. Soon after Brown's visit, William Weld, Governor of the Commonwealth of Massachusetts, visited Bangalore to formalize a "sister state" arrangement through which Massachusetts and Karnataka would cooperate in the areas of the environment, education, industry and trade.(5)

While Secretary Brown's visit emphasized the United States' support for India's reforms, Governor Weld's visit to Karnataka emphasized the kind of state-to-state cooperation which is making states and cities around the world increasingly independent of the nation of which they are a part. Bangalore and Boston have developed those ties along the lines of their high-tech industries. Highly skilled workers in Bangalore "repair the potholes and clear the roadblocks on information highways all over the United States." Moreover, the combination of a sophisticated software industry and highly skilled labor pool may make Bangalore a "harbinger of a new global labor force that works in cyberspace and that operates beyond the reach of governments." Bangalore's close ties to Boston have grown over recent years out of the professional, corporate, and personal associations developed by the people in Bangalore and those who work along Route 128, Boston's high tech corridor. Such association has led at least one observer to state that "in cyberspace, Bangalore and Boston are practically the same place."(6)

The rise of the interdependent global information economy of the late twentieth century is exemplified by the "sister state" arrangement between Massachusetts and Karnataka. Moreover, Bangalore's leap into the leading ranks of global information technology challenges the conventional development(7) notion that the so-called developing(8) countries must follow a certain path to development earmarked by the experience of Western industrial nations, moving from an agricultural base to manufacturing and finally to high tech services. The leap taken by Bangalore, however, also refutes the oft-cited notion that the development and use of information and technology necessarily improves the life, self-reliance and governance of millions of people around the world. Despite the

success of its IT industry, Bangalore still faces the same difficulties affecting thousands of cities, and their residents, around the world. For example, the success of Bangalore's high-tech industry has worsened disparities among its people. While computer professionals' salaries average \$10,000 US per year in a predominantly agricultural country of one billion people, the average per capita income in Bangalore is only \$400. There are seven computers for every 10,000 Indians, compared to 2,500 for every 10,000 in the U.S., 1,070 in Singapore and a world average of 250.(9) Bangalore's high-tech industry is becoming decreasingly dependent upon the local and regional economy, and the industry has not taken up its share of civic responsibility traditionally borne by Bangalore's elite. For example, in 1994, the roughly dozen high-tech and industrial parks created around Bangalore—which come with their own sewage, power and communications systems—attracted about 10 times more investment than the city raised in property taxes. Yet, hardly any profits have been put back into Bangalore, a city where several thousand other businesses still depend on the city's overstressed infrastructure. Moreover, the success of Bangalore's high-tech industry has attracted millions of people from all over India, with different languages and cultures. The result is an over-crowded city of five million residents where the sustainability of a vibrant civil society is difficult to maintain.(10) Hence, although Boston and Bangalore may be practically the same place in cyberspace, they are not the same place socially, economically and politically. Tensions are rising in Bangalore due to the presence of multinationals. Billions of dollars are needed to improve the city's overstressed infrastructure, and the wage differentials between the high-tech industry and the rest of the economy are beginning to create tensions between the rich and the poor.(11)

The example of Bangalore highlights the complexities surrounding the growth of the global information economy, the relationship between technological and urban and rural development, and the role of information and information technologies in governance into the twenty-first century. Although much research has been conducted in the area of information technologies and their impact on the growth of "information societies" in Western industrialized economies, empirical evidence on the impact of IT in the rest of the world is generally weak. Research on the use and impact of IT on governance at the national and local levels around the world is scarce as is research that is able to measure the economic impact of adopting such technologies at all levels of government.

Some Basic Concepts of the Information Literature

In his book *The Informational City* (1989) Manuel Castells argues that we are witnessing the second great transformation of modern times. The first fundamental change was a shift from an agrarian to an industrial mode of production. According to Castells, we are now facing the transition from that mode of production to an "informational mode" in which the basic inputs are no longer material, but knowledge-based. The literature on the use of IT that was reviewed for this report, published primarily in the West and in English, suggests that modern information and communications technology are changing the world we live in. Stories abound in daily newspapers and weekly magazines in the U.S. that speak of improving citizen services through "automating statehouses," creating

“electronic courthouses,” “raising revenue through technology,” and “governing through the information superhighway.”(12) As Castells (1989) argues, in moving from an “industrial” to an “information” society, information and knowledge have not only become the principal raw materials, but are usually the product as well.

But what is information? What do we mean by knowledge? What is information technology? Most of the literature reviewed and most of the discourse in the U.S. assumes an accepted standard and a common understanding of the meaning and significance of these terms which have become part of our everyday vocabulary. However, a closer look at their meaning may yield a better understanding of what the “information hype” is all about, allowing us to better assess the differences in the perceptions and usage of the terms in many societies around the world. It is important to review these concepts in order to understand the critical role of information in governance and “development” into the twenty-first century. The information science literature does not offer a generally agreed upon understanding of the semantics of “information.” Is “information” only that which is collected and processed through machines? What about the meaning, context, intentions and criteria of the information user?

According to Montviloff (1990) and Blanc (1985), what we commonly refer to as “information” is only one step on an intelligence ladder which goes from “data” to “wisdom.” Montviloff and Blanc have identified four levels of cognitive products on the intelligence ladder: data, information, knowledge and wisdom. Data represent the level composed of all the facts or “raw materials” at hand that, once compiled for the purpose of use, describe the problem at large in a meaningful manner. For example, a survey of farmers, scientists, and agricultural extension agents aimed at studying farming techniques will result in data. Information refers to the synthesis and interpretation of data that will make sense in the context of use. In other words, information is data which have been organized, processed and structured according to a purpose. In the previous example, the analysis and interpretation of the responses to the survey by the various respondents represent information to the researcher. Knowledge takes place within each individual’s mind when new information is fused with past experiences. Knowledge answers the questions what, why, where, who, when, and how so that the use of information by the researcher to make a judgment on farming techniques represents knowledge. Finally, wisdom is continually enriched and updated knowledge. This process occurs when knowledge confronts reality. In our example, the researcher or agricultural institution can use information gathered about farming techniques in different localities and about different projects to meet new challenges. Although this definition of information might strike the reader as general, it is accepted as a common truism in the study of information. In this report, the word “information” is used in this specific sense, one step in the process from data to wisdom. Although there is ambiguity in the literature regarding the nature of information, such is not the case with information technology (IT). In its broadest sense, IT covers all technologies used in the collection, processing, and transmission of information. This includes microelectronics- and optoelectronic-based technologies as well as computers, telecommunications, electronic office equipment and software products.(13) IT dominates the production and consumption of

information literature in the Western academic world. Its importance, both in the literature and in the growing global information society, deserves special attention. Information Technology A recent report by the World Bank referred to IT as “an extremely dynamic area for the Bank” (Hanna and Boyson, 1993). Bank lending on IT is said to have increased by 235 percent between 1986 to 1991, not including lending for telecommunications. The same 1993 report indicated that more important than the level of lending is the presence of information systems components in approximately 90 percent of the Bank’s lending operations. According to the report, such dynamic growth is due to the “escalating demand by borrower countries for computing power that has become increasingly flexible, reliable, and lower in cost.”

The report by the World Bank speaks clearly to the growing importance governments around the World, especially those in the developing world, are placing on IT as a component in the development process. IT is seen as a new component of development, able to provide solutions to long-standing challenges and new development priorities. In the industrialized economies of the West, however, this is not a new trend. In Japan, for example, the Industrial Structure Council, a central consulting institution of the Ministry of International Trade and Industry (MITI), recommended as early as the 1970s that computers, semiconductors and software should be priority areas for MITI’s industrial policy (Latzer 1995). In Canada, Sweden and the Netherlands, policy makers have been advocating the importance of IT to national growth and competitiveness in the global economy since the early 1980s (OECD 1992). And in the U.S., IT has been central to the information debate since at least the mid 1970s when IT was made a key component of a report entitled National Information Policy submitted to President Ford in 1976 by the U.S. Domestic Council. The report was geared toward the development of a coordinated National Information Policy able to respond to the challenges of the “information age.”(14) Some local and regional governments in the West have also attempted to use IT to meet new challenges of governance, sometimes moving ahead of initiatives at the national level. For example, the Municipality of Genoa in Italy embarked on a number of major “automation” drives of the routine administrative procedures in the early 1970s, becoming one of the first Italian local authorities to be equipped with computer facilities. The towns of Heidelberg in Germany and Marseilles in France, as well as the city of Vienna in Austria, have all introduced IT into their administrations to provide high quality services to constituencies in an economical fashion.(15) In the U.S., cities across the country are increasingly adopting IT to face the new challenges brought about by the “information age.” Big and small cities and regions such as New York, Boston, Omaha, Heathrow in Florida, Ely in Northern Minnesota, and Seattle, have introduced IT to face the threats, and take advantage of the opportunities, brought about by globalization as they strive to acquire or retain most needed economic activity (Elam et al. 1989). But what is the role of IT in future society, both “local” and “global”? The literature that has emerged in the last twenty years on the subject is as diverse and controversial as IT itself. There is little consensus as to what the significance of IT is and will be for civil society.

The work of Miles, Rush, Turner and Bessant (1988), however, stands among the most comprehensive on IT. Miles et al. have outlined some major differences in assumptions that have dominated the IT debate in the last three decades. Their typology is among the

best works to date, allowing the reader to make some sense of the IT debate and to illuminate issues of relevance to today's academics and practitioners both in the public and private sectors. The typology developed by these authors centers around distinctive themes and positions present in the IT literature. They have identified three viewpoints: the transformist, continuist, and structuralist schools. Each of the three positions provides a different account of the ways in which technological change interacts with social processes. For the transformists, "the emergence of IT represents a major metamorphosis of civilization" which will transform every aspect of our every day lives. IT is seen as producing a global information economy, a shift as significant as the historical transitions of the past: from hunting and gathering to agricultural and industrial societies. From this perspective, IT will fundamentally change the bases of political power and social classes accelerating the process of value change "as it exposes people to new information" and to new ways of dealing with that information. As a result, the "positive demonstration effects" of IT in meeting new social and economic needs will promote rapid diffusion and organizational adaptation.

At the other end of the spectrum, proponents of the continuist school express great skepticism about the magnitude of the changes brought about by IT. They see the transformists' "revolutionary" claims as grossly overstated and are cautious about their estimates of the rate of diffusion of the more advanced forms of IT. The emergence of IT is seen as the next logical step in the wake of earlier generations of computer and communications technologies. New information technologies are adopted for reasons other technologies were adopted in the past: to increase competitiveness, efficiency and productivity. Although it is acknowledged that new skills and organizational frameworks are required, these new learning processes are thought to develop far more slowly than is proposed by the transformists. Miles et al. further argue that social institutions, which often resist rapid change, will channel technological choices. Hence, the rate of diffusion of IT will be much slower than claimed by transformists, and there are likely to be many mistakes, failures and discouraging experiences as a part of the normal evolutionary process. As a result, while transformists view cultural differences as a facilitating factor in technological change, continuists view it more as an inhibiting factor. The main features of society are liable to remain unchanged by the use of IT since change will come from social and political initiatives.

The third view on the IT debate belongs to the structuralists. Although they believe that IT has important implications for economic structure, and thus may also lead to the reshaping of many areas of social life, they do not see the changes arising out of IT development as signaling a fundamental transformation of industrial society into a completely new social order. Rather, they see it as a process more likely to facilitate a further development of industrialism. From this view, the diffusion of IT is predicted to be uneven, with some countries and sectors proving far more able to capitalize on the potential for positive change.

As the debate among the transformists, continuists and structuralists shows, there is little agreement on the role and impact of IT as we enter the twenty-first century.

Information and Development

Although the information debate in the West has been dominated by issues of information technology, there is much preoccupation in the rest of the world with the monopolization of the information “revolution” in the West and the effects of such a revolution on international relations, national development and governance. For example, in the Islamic world, which constitutes one-fourth of the world’s population, information and the diffusion of IT are generally perceived as “ethnocentric,” carrying the systems of values of the West. According to Mowlana (1994, p. 225), “Muslim societies in general have a rather skeptical view of the West’s information and media expansion, to say the least. The history of colonialism shows that the West extended its hold on Muslim heritage and resources not only economically and politically but also culturally and through the expansion of their communication media and control of information.”(16) Notwithstanding, as early as 1982, the Governing Council of the Society for International Development (SID) declared in the Tokyo Session that “information is not a luxury, nor is it a fashionable gadgetry. It has become an essential instrument for development.”(17) SID’s preoccupation was justified by the fact that in 1983, over half of the working population of the industrialized world was employed by the information industry and its related fields. That number has increased, and by 1992 the OECD reported that over 60% of the labor force in Europe, North America and Japan was mainly concerned with the processing of information and knowledge (OECD 1992). In contrast, in 1983 the actual share of the developing world in the information industry was well below 10%, and its investments in scientific and technological research in this area did not exceed 3-4% of the world total.(18) Figures for the 1990s are unlikely to change in the aggregate, given the development crisis faced by most countries in Africa, Asia and Latin America in the 1980s and into the 1990s. These figures speak to the imbalances found throughout the world in the information industry.

One aspect of the diffusion of information and IT that has the potential to create increased international tension between the developing and the rest of the world is the unbalanced use and application of IT in different countries and regions (Jussawalla 1989). A result of such an imbalance may be that the benefits of the application of IT are generated and remain in one particular region at the expense of less innovative economies. On the other hand, the pattern and composition of international trade between industrialized economies and the rest of the world has yet to be proven affected by the development and diffusion of IT. Since services are traded less often than goods, whether or not an increasing share of trade is to be realized by the developing countries as a result of diffusion of information and IT is open to question. Moreover, free flow of information and wide diffusion of IT has already begun to create difficulties in conjunction with intellectual property rights and sovereignty of national economies.

Intense empirical research in this area is needed, as well as more dialogue and cooperation among the countries concerned to reach solutions to these complex problems.

Yet, in no area is the need of the developing world as great as it is in that of “information.” Not only is there greater need for external information, but even the

information produced locally is frequently inefficiently managed, forcing countries to import it at great costs from outside sources. We believe that in the world of the twenty-first century, no country can afford not to join the information revolution nor can any country resist its all-pervasive impact.

The concern with information in the developing world, however, is a more recent phenomenon than in the industrialized economies of Japan, Europe and North America, both in theory and practice. Until recently, the literature assessing the progress of development efforts throughout the developing world, commonly referred to as the “development literature,” often cited political, economic, social and administrative reasons as the key factors to consider in an attempt to understand the poor results of development efforts up to date. In fact, until the 1970s, the relationship between development and information remained in the background of public discourse. Since UNESCO took a leading role in the 1970s, information has become increasingly central to the process of development to the extent that it is the subject of intense planning and coordination by all actors involved, including international agencies, national and local governments, and multinational corporations (Dosa 1996; Hanna and Boyson 1993; CONACYT 1988; UNESCO 1987; McAnany 1980).

The recent awareness of the importance of information in most of the developing world can be assessed by looking at some results of empirical studies on the subject. For example, Dosa (1980) reviewed existing knowledge on information activity as it related to local revenue projects in developing regions. She found that little was known about the role of information, although projects incorporated information support in various forms. The lack of a conceptual framework able to accommodate the various interpretations of what constitutes information, the lack of connection between information systems and development plans, and an overemphasis on building sophisticated information systems without evaluative tools, among others, reflected the secondary importance given to information in developing regions.

Research also shows that the nature and growth of information and information technologies is neither universal nor linear throughout the world. In a cross-national study of selected industrialized and developing countries, Katz (1988) found that it is politics rather than markets that drives the definition, collection and use of information and information technologies in developing countries. As Katz points out, the increase in demand for information workers in many, if not most, developing countries is due more to the growth of the government than to the expansion of the private manufacturing and services sector of the economy. Whether an information technology is adopted or not depends greatly on that country’s internal patterns of influence, power, and resource allocation policies as well as the degree of its political interdependence at a worldwide level. Katz observed that within industrialized regions the economy is the main explanatory variable for the transition to an information economy. In developing regions, politics is the one variable that is decisive in driving such transition.

Further research has shown that there is no one specific model of information that encompasses all countries and regions. Although information is by now a common

variable in the development process of most, if not all, developing countries, the level of capabilities to handle information differ across countries (Schipper and Cunningham 1991; UNESCO 1985; McAnany 1980). Moreover, the level of complexity of information needs differs not only between but also within countries and regions. Different regions, and different countries within regions, have diverse information facilities in terms of the infrastructure available and the extent of information usage. Also, after its experience in promoting national information policies, UNESCO declared that there are no universal formulas for promoting such policies. Therefore, no overall model of information applies to all regions and countries.(19)

Lastly, research shows that more information by itself does not guarantee reductions in uncertainty, as the previously mentioned findings by Dosa (1980) suggest. Planners, decision makers, government officials, and administrators throughout the developing world have been known to collect data and information regardless of its appropriateness and accuracy.(20) Such attempts can generate uncertainty and inconsistency, the very problems that, in theory, information is utilized to avoid.

Information, thus, is a critical component in the design, implementation, and evaluation of development plans and governance at the national, regional and local levels. It is also an increasingly valuable commodity for governments. According to the United Nations (1985), the development of national information systems and the capability of handling information are central to economic and social progress, both for the generation of new knowledge and for its application in the process of development. Picking out from the massive amounts of information that which is really of value, and channeling it through efficient channels and productive uses, is no longer a particular concern of successful businesses (Tapscott 1996). It is also the concern of national, regional and local governments that find themselves under increasing pressures to be more effective and more responsive to the needs of their constituencies with, more often than not, decreasing revenues and resources. Moreover, national information systems should be closely linked to development objectives (UN 1985). By the same token, however, UNESCO (1985) notes that the social and institutional mechanisms to share, diffuse and utilize information have not yet been fully developed. Further, “governments are still striving to define and implement national information policies”; yet, information remains an essential national resource.

Information Policies: The Global Experience

The diversity of experiences with information policies found around the world speaks to the different degrees of importance information has received in different regions. For example, in the United States, information policy is concerned with a set of interrelated principles, regulations, guidelines and procedures that guide the oversight and management of the information life-cycle. The Information Infrastructure Task Force created by the Clinton Administration in 1993 identified nine principles for government action on information, including the promotion of private sector investment and the encouragement of flexible and responsible government action.(21) In Canada,

information policy is being propelled by the explosion of information goods and services.(22) In the Asia Pacific Region, Singapore has deliberately prepared to meet the new challenges of the information age by developing a substantial national IT capability. Through its IT2000—A Vision of an Intelligent Island—Singapore expects to become the first “developed city of distinction in the tropics.”(23) Meanwhile, the European Union (EU) has recognized that there is a close link between the sophistication of a country’s information infrastructure and its economic prosperity. In December of 1993, the Commission of the EU published a White Paper on competitiveness which highlighted the importance of moving forward towards the information society as one of the key elements to assist the Union in achieving growth, competitiveness and employment.(24)

However, the experience in most of the rest of the world in enacting information policies, especially in the developing world, is a rather recent event. The rise of service economies and the advance of new technologies have generated a positive evolution in the attitudes of governments towards information activities, making governments question their priorities in the information realm. Many have come to recognize that in the increasingly interdependent global information economy of the twenty-first century, governments need to make information resources and services more responsive to changing economic, social and political needs.

UNESCO has been a catalyst in promoting the design and formulation of information policies throughout the developing world. As defined by UNESCO an information policy is “a set of policies that provide guidance for the design of a strategy and programs for the development and use of information resources, services, and systems.”(25) Such a policy is required to “ensure the harmonious implementation and operation of information resources, services and systems such as timely access to relevant information to varying needs of users throughout the society, coordination and compatibility of the overall national information system, better complementarity and compatibility between the various legislation concerning the provisions of information, better responsiveness to the implications of new information developments and more effective participation in regional and international information systems and networks.”(26) The basic premise of an information policy is that any economic, social and political system with a coherent information policy will perform more efficiently. The information policy will be the mechanism through which society ensures that its decision makers, planners, managers, executives, researchers in the government and private sectors and professional practitioners have timely access to up-to-date, relevant and reliable information.(27)

The goal of information policy is to “attain access to and optimal utilization of the specialized and professional knowledge, the scientific, technical, social and economic information and expertise generated and/or available within the country and elsewhere in the world as a problem-solving resource and as a resource for development in all sectors of the society.”(28) UNESCO also indicates that information policies closely interact with policies in libraries, archives and in the rapidly converging fields of informatics and telecommunications. As a result they must remain flexible to adapt and adjust to specific changes at a specific period of time.

The experiences with information policy in the developing countries have been mixed and often diverge from those of highly industrialized countries and some newly industrialized countries of the Asian Pacific region. Despite UNESCO assertions that national information policies are essential in the development of any society, research shows that such assertions have not translated into purposeful and strategic national policies in most of the developing world. Information professionals throughout Africa and most of Latin America express frustration at what they perceive as a lack of government commitment to strengthening the role of information via coherent information policies (Páez Urdaneta 1990; CONACYT 1988; UNESCO 1987). In a regional seminar on “National Information and Informatics Policies in Africa,” sponsored by the Pan-African Documentation and Information System and the International Development Research Center and held in Ethiopia in 1988, African information experts reported major obstacles in attempts to develop and institute information policies. The most important obstacles reported by Leonard and Mara (1990) were:

1. the shortage of qualified personnel in all areas of information;
2. the lack of access to existing information resources;
3. inadequate physical facilities—equipment, reading rooms, books, journals, etc.;
4. insufficient financial and material resources for information activities—foreign exchange shortages may constitute an “insurmountable” problem for developing countries in the import-dependent information field;
5. overwhelming obstacles that prevent the implementation of networked systems, especially the absence of even minimal infrastructure support.(29)

The general feeling of most information professionals studying the developing world seems to be that government officials often do not appreciate the role that information could play in solving economic and social problems of governance. Nonetheless, within the last fifteen years all developing countries have had to adjust to changes on a variety of issues related to information policies: censorship, intellectual property rights, copyrights, trademarks, patents and telecommunications to name a few.(30) However, three major themes emerge from the complexity of issues motivating current information policy in developing countries. As reported by Leonard and Mara (1990), they are:

1. determination to preserve cultural and social heritage, especially from domination by outside influences;
2. fear of political and economic sanctions for failure to comply with the intellectual property rights laws of the highly industrialized economies; and
3. apprehension that advances in IT will increase the economic polarization between rich and poor countries.(31)

Therefore, the literature on information and development and information policies in developing countries calls for action to increase awareness among government officials, international organizations, consultants and their counterparts, professional groups, local groups and all those involved in the development process about the importance of information in development. In two different reports on guidelines for national information policies, UNESCO notes that there is an imperative need to discern how best

to convince politicians and decision makers that information is an indispensable and basic resource for effective development planning and governance, and to win them over to recognize the need for incorporating information planning into national development plans.(32) The challenge, however, to convince politicians and decision-makers to focus on long-term benefits is difficult. In developing countries as elsewhere the economic or technical rationale supporting a decision is likely to be revised and even discarded on the basis of a political rationale. A way must be found to demonstrate the incremental benefits over the short, medium and long term, particularly within the context of specific policy objectives associated with governments at the national, regional and local levels. In this respect, it may be worth considering information components as inseparable parts of clusters of investment.

In this regard, information should fit the contextual needs of the problem at hand. Therefore, instead of addressing politicians and decision makers on the issue of “information,” it may be worthwhile to frame the issue as a set of information-related governance problems. What policies should regulate transborder data flows, given their centrality to the national economy? How can technology transfer be accomplished with sensitivity to local conditions? How can institutional and structural capabilities be developed to increase information handling capacity? How can a competent workforce be built that is able to meet the challenges an information economy would pose? How can information technologies be utilized in order to make governance more efficient and economical? Clearly, the message to government officials must communicate the salience of information to competitiveness and productivity.

Proposed Research

Although the information literature in the industrialized economies emphasizes the technological aspects of information, it should be understood that the transition to an interdependent global economy where information societies play a key role is not solely about technology. It is also about social change. No one understands this fact better than citizens and public officials at all levels of government in the West and, increasingly, government officials and citizens at national, regional and local levels in the developing world. The dynamic nature of IT and its rapid advances have outstripped our understanding of their real meaning for, and effect on, people, their work and their personal lives.

The information revolution of our times raises an interesting dilemma for the twenty-first century: On the one hand, no development process can any longer take place without heavy reliance on information and communication technologies; on the other hand, these technologies and the information they carry are highly value-loaded, disrupt development patterns, and seriously affect the socio-cultural environment of the industrialized as well as of the developing countries. Bangalore, India’s silicon city, is a case in point. The choices, however, seem to be limited.

As in any relatively new field, research usually leads to more questions than answers. How should we proceed in a world that is witnessing challenges to traditional forms of

government and organization and at the same time the exponential explosion of information and information technologies? How will we address the problem of increasing disparities between the “information haves” and the “information have-nots”? This latter point in particular is important to address in a world where national information flows in developing countries are affected by political, as well as social, cultural, ethnic and economic factors. How are societies throughout the world changing in this new world of information and technology? How may the extreme inequalities of economic conditions between and within the developing world and the industrialized economies affect the participation of citizens in governance and in the information age? How will access to information be ensured to support participatory governance? What is known about information policies around the world? What are the incentives for officials at all levels of government around the world to invest in IT? What are the tangible and intangible benefits? How can the highly technical information revolution interact with and preserve indigenous forms of information gathering and dissemination? What are the political-economic and geographic consequences of the information age? What will that do to the traditional concepts of citizenship, sovereignty, and the nation-state?

These are only a few of the questions that need to be dealt with to better understand the social, political and economic consequences of the information age. From these beginnings, a more comprehensive research agenda can be developed and executed by interdisciplinary teams of academicians and public and private sector officials around the world. Although information and IT promise new channels for participation, social learning and governance, little empirical evidence exists on the development, impact and benefit of information on governance around the world. There are almost no studies that provide a comparative analysis able to advance from the particular to the general. The research that has been done has focused primarily on the industrialized economies, while research relevant to the developing world is almost non-existent.

We propose the advancement of empirical research that has as an overarching theme the investigation of the question of how governments can assess the economic impact of instituting information technologies to improve governance. First, research is needed on the economic benefits of investing in IT in different sectors at the national and local levels. The economic rationale for such investment, as all levels of government around the world experience increasing demands and tighter budgets, is yet to be shown empirically. Second, a comprehensive survey of National Information Policies is needed representing selected countries in all regions of the world. This research is rather scarce, especially in regard to policies in the developing world. Undertaking such research will allow for a comparison of various social, economic, cultural and political factors that impact on the enactment, or lack thereof, of information policies in both the developing and the industrialized world. It will also allow for the study of different regional and international efforts at policy cooperation and coordination which may be developing around the world as regions consolidate into economic blocs. Finally, research is needed to analyze how cities throughout the world are using information technology to improve performance and to reshape the social fabric of the city of the twenty-first century. Such research is rather scarce. Although some work has been done to assess the development and impact of information technology on cities in the U.S. and Europe, a comparative

analysis able to advance from the particular to the general has not been conducted. Moreover, a comparative analysis able to depict the experience of information technology use by cities in the developing world is non-existent, let alone one able to compare and contrast the development and use of information technology in cities across the more industrialized North America, Europe and Japan, and the rest of the world. Given the different factors that affect the development and use of information technology in different societies, the cultural differences across societies, and the increasing pressures for greater efficiency and delivery of government services, a study that compares, contrasts and draws generalizations from such a variety of experiences is much needed.

Annotated Bibliography

Books

Barr, Trevor, ed. 1987. *Challenges and Change: Australia's Information Society*. (Melbourne: Oxford University Press). A team of prominent Australian information specialists offer their views on major issues regarding national information policy in Australia. The concepts of information and the economy are discussed as well as the relation between information, citizens and social and state policies. International information issues are presented and national directions proposed.

Blake, Virgil L.P. and Renee Tjoumas. 1990. *Information Literacies for the Twenty-First Century*. (Boston: G.K. Hall & Co.) A multidisciplinary team of scholars address the impacts, implications, and possible outcomes and effects of computer technology on the information environment, culture, and society in the US. Literacy is the focus and thematic thread. The volume provides some guideposts for both reflection about the future and action.

Block, Eskil and Tibor Hottovy. 1988. *Future Cities and Information Technology*. (Gavle: The National Swedish Institute for Building Research). A framework for speculation about the future of cities and technology is developed. The authors present a general overview of how cities and habitats evolved and what alternative futures lie ahead for cities into the twenty-first century.

Branscomb, Anne W. 1994. *Who Owns Information? From Privacy to Public Access*. (New York: Basic Books). The author places a call for action to citizens and scholars in shaping the emerging information society through her analysis being directly linked to current social issues.

Castells, Manuel. 1989. *The Informational City: Information Technology, Economic Restructuring and the Urban-Regional Process*. (Oxford: Blackwell). Argues that the world is witnessing the transition from an industrial mode of production to an informational one in which information, rather than iron or coal, becomes the basic medium of development.

Computer Science and Telecommunications Board, National Research Council. 1996. *The Unpredictable Certainty: Information Infrastructure Through 2000*. (Washington, DC: National Academy Press). This book is a synthesis report representing the collective view of 12 experts on the United States' National Information Infrastructure (NII) 2000 project.

Council of Europe. 1992. *Advanced Information Technologies: the impact on training*. (Strasbourg: Council of Europe Press). Proceedings of the 4th Seminar of the European network of training centers for local and regional authorities staff, held in Genoa (Italy) in 1992. Working documents from Italy, Germany, France, Austria, United Kingdom, Belgium and Spain.

Dierkes, Meinolf and Ute Hoffman, eds. 1992. *New Technology at the Outset: Social Forces in the Shaping of Technological Innovations*. (Boulder: Westview Press). The range of works presented share the common view that technology is deeply affected by the context in which it is developed and used. Scholars from a wide variety of backgrounds contribute to the understanding of technological development as a social process mainly in Europe.

Dordick, Herbert S. and Georgette Wang. 1993. *The Information Society: A Retrospective View*. (Newbury Park: Sage). The authors set out to examine whether there is sufficient evidence to show that the promises of the last thirty years have been met and that we indeed can claim the emergence of an information society. Results are shown to be mixed between OECD countries and the rest of the world.

Dosa, Marta. 1996. *Across All Borders: International Information Flows and Applications*. (Maryland: Scarecrow Press). In press. Presents a collection of papers written by the author over twenty-five years of work in the field of information. Dosa's conception of the problem-context of information seeking, the meaning of information need and information requirement, and the concept of technical assistance are examined through her original writings. The book is divided in six sections: information and national development; human resource networking; problem solving and information counseling; information policies; education training and professional development; and the American transnational corporation and information.

Hanna, Nagy and Sandor Boyson. 1993. *Information Technology in World Bank Lending: Increasing the Developmental Impact*. (Washington, D.C: The World Bank, Paper Number 206). The study undertaken by The World Bank's Asia Technical Department examines the role of information technology applications in the bank's lending and the means to enhance their developmental impact. Annexes describe the rationale and design of the study.

Institute for Information Studies. 1993. *The Knowledge Economy: The Nature of Information in the 21st Century*. (Nashville and Queenstown: IIS). Six essays on the "nature" of information. Information is examined as a "commons": a resource to be shared not owned. The impact of new technologies on the nature and definition of

information is considered as well as the effect they have on the fields of education, economics, sociology, technology, business, and world affairs.

Jussawalla, Meheroo, et al., eds. 1989. *Information Technology and Global Interdependence*. (Westport: Greenwood Press). Thirty-six essays explore the role of information technologies and likely implications and repercussions they have for global affairs. The volume is divided in eight sections: introduction to information technology; interdependence policy and practice; banking, finance and trade; legal issues; sociocultural issues related to information technologies; innovations and future trends; telecommunications and development; and conclusions and recommendations.

Katz, Raul L. 1988. *The Information Society: an International Perspective*. (New York: Praeger) Compares the information societies emerging in the developed and developing worlds. Analyzes four basic questions: is there a universal process of emergence of a sizable information sector in the workforce structure across countries, particularly in the developing world? is there a similarity in the internal structure of the information sector in different countries? are there any universal trends in the process of diffusion of information technologies on a worldwide level? and, what are the factors causing different evolutionary paths and distinct profiles of information societies?

McAnany, Emile G. 1980. *Communications in the Rural Third World*. (New York: Praeger). The book analyzes the role of information in development through case studies in the Ivory Coast, Guatemala, and Brazil. The author attempts to assess the role of communication in nonformal education and the impact of communication in the poorest segments of society. The case studies show the necessity to combine both political and technical analysis of the problem of the rural poor if information is to have a positive role in change.

McGarry, Kevin. 1993. *The Changing Context of Information*. (London: Library Association Publishing) The difficulty in defining information is analyzed. Knowledge, information and perception are discussed as well as the psychological aspects of information; the social organization of knowledge; and the ethical and professional aspects of information.

Miles, Ian, et al. 1988. *Information Horizons: The Long-Term Social Implications of New Information Technologies*. (Brookfield: Edward Elgar). Three approaches to thinking about the role of information technology in future society are presented (continuists, transformists, structuralists). Technology trends are discussed as well as awareness about information technologies and the broader issues associated with it (use, implementation, living and acting on information technology).

Montviloff, Victor. 1990. *National Information Policies*. (Paris: UNESCO). This handbook on the formulation, approval, implementation and operation of a national policy on information provides a practical and easily applicable methodology for the formulation and implementation of national information policies in different socio-economic environments.

OECD. 1992. *Cities and New Technologies*. (Paris: OECD). Proceedings of a Conference held in Paris in 1990 on the impact of technology in Cities. Papers are divided into four different sections: "Information Technology: The Urban Dimension"; "Information Technologies, the City, and the Urban Society"; "Application of Information Technologies in Urban Services"; and "Making Good Use of New Technologies in Cities: Facts, Reflections, Recommendations."

OECD. 1992. *The Changing Public Policies in Information Technology: Canada, The Netherlands and Sweden*. (Paris: OECD). This OECD report presents an analysis of the evolution process of policies for the promotion of the use of information technology during the 1980s in Canada, The Netherlands and Sweden. The report is in English and French.

Rondinelli, Dennis and Shabbir Cheema, eds. 1983. *Decentralization and Development*. (London: Sage). Leading development specialists review a variety of decentralization programs in developing nations; examine the experience with implementing them; and identify the social, economic, political, and administrative factors that seem to influence the success or failure of decentralization policies.

Rosell, Steven A. et al., eds. 1995. *Changing Maps: Governing in a World of Rapid Change*. (Ottawa: Carleton University Press). The book tries to answer the question "how can we organize and govern ourselves successfully in a world of rapid change and increasing interconnection?" It describes the efforts by a roundtable of Canadian private sector executives and senior public servants who try to make sense of the emerging global information society and its implications for governance in Canada.

Schipper, Wendy and Ann Marie Cunningham. 1991. *National and International Information Policies*. (Philadelphia: The National Federation of Abstracting and Information Services). National and international information policies, and concerns and issues related to them, are discussed in the context of five prominent world regions: the United States, Canada, Europe, the Asia Pacific Region and the 'developing' world. The vastly different needs and views of what is needed in information policy are revealed; the current developments in the areas of copyright, standards, licensing, telecommunications, government policies, regional politics, and the role of the private sector are discussed; and the dilemma regarding the need of information policy and the resistance to controlling the flow of information is addressed.

Smilor, Raymond W. et al., eds. 1988. *Creating the Technopolis: Linking Technology Commercialization and Economic Development*. (Cambridge: Ballinger Publishing Co.). Leading authorities from Europe, North America and Asia examine, compare and contrast mature, developing and emerging technopoles in the world. They assess the dynamics among business, government, and academia in creating and sustaining the technopolis.

Smith, Michael P. and Joe R. Feagin, eds. 1987. *The Capitalist City: Global Restructuring and Community Politics*. (New York: Basil Blackwell). Contributions to

this book highlight several important factors about urban development in the transforming global economy of modern capitalism such as the relation between urban development and cities' transnational linkages to the global economy; the 'international division of labor' amongst the world's cities; the relationship between economic, state, and community restructuring; and the role of people's everyday activities in the process of urban transformation.

Splichal, Slavko et al., eds. 1994. *Information Society and Civil Society: Contemporary Perspectives on the Changing World Order*. (Indiana: Purdue University Press). The relationship between the "older" concept of civil society and the "newer" one of information society is discussed by the international contributors. The fundamental tension between the two is analyzed: civil society usually referred to within state-limited boundaries and information society as a "global" society. The problems and promises of both concepts are illustrated as they relate to free and democratic communication in a "global" civil society.

Tapscott, Don. 1996. *The Digital Economy*. (New York: McGraw-Hill). This business oriented book explains the new economy, the new enterprise, and the new technology and how they link to one another. Geared toward business leaders who want to transform their business for success in the new economy.

UNESCO. 1985. *Guidelines on National Information Policy: Scope, Formulation and Implementation*. (Paris: UNESCO). Discusses UNESCO's view on national information policies. It presents guidelines for countries aiming at formulating and implementing such policies.

United Nations. 1985. *Scientific and Technological Information for Development*. (New York: UN). The report argues for the importance of scientific and technological information, national information systems, and the creation of knowledge in the process of development.

Wagner, Fritz W, et al., eds. 1995. *Urban Revitalization: Policies and Programs*. (Thousand Oaks: Sage). This volume is a collection of case studies on seven US cities that examine revitalization programs of the past 15 to 20 years, analyzing their successes and failures. Excellent source for a "how to" on cities' case studies. Sample categories for writing the cases provided.

Webster, Frank. 1995. *Theories of the Information Society*. (London: Routledge). The author examines and assesses the variety of post-war theories that have emerged to explain the rise of the "information society." He concludes that it is premature to speak of an information society. Instead, the author argues, we should emphasize the "informatisation" of established relations.

Willcocks, Leslie and Jenny Harrow, eds. 1992. *Rediscovering Public Services Management*. (London: McGraw-Hill). The book analyzes how public services have been managed in Britain since 1979. The first part provides an overview of management

initiatives in public services while the second deals with major issues informing the post-1979 management initiatives, including the utilization and management of Information Technology in public services settings.

Articles

Barret, Katherine and Richard Greene. May 24, 1994. "Lead or Bleed: Lessons in automating the statehouse." *Financial World*, pp. 34-50. Accepts that information technology will change the way states do business and alter the balance of power between the states in the direction of those using new advances most successfully. It warns about the risks involved in overselling new technologies in the political arena.

Blanc, Gerard. 1985. "Beware of the Information Age." *Development: Seeds of Change*, 1985, No. 1, pp. 78-79. Argues that although the information society may be a good idea, recent trends takes us in the opposite direction. Calls for an understanding of the meaning of information, how it is used and for what purposes.

Brudney, Jeffrey L. and Sally Coleman S. March 1995. "The Adoption of Innovation by Smaller Local Governments: The Case of Computer Technology." *American Review of Public Administration*, Vol. 25, No. 1, pp. 71 -86. Analyzes factors relevant to adoption of electronic data processing technology; based on surveys of 297 Georgia cities with a population of less than 50,000; 1985-90.

Business America. February 1995. "Presidential mission led by Secretary Brown to India participates in contracts worth more than \$7 billion." Vol. 116, No. 2. Describes the Presidential mission's trip to three Indian cities: New Delhi, Bangalore and Bombay.

CONACYT—Consejo Nacional de Ciencia y Tecnología. 1988. "Primer Seminario sobre Políticas Nacionales de Información para la Investigación y el Desarrollo." Mexico, D.F., 1988. The report presents a summary of the discussions and recommendations of a symposium geared toward analyzing the role of information in Mexico's national development.

Curwen, Peter. September 1995. "Telecommunications policy in the European Union: Developing the Information Superhighway." *Journal of Common Market Studies*, Vol. 33, No. 3, pp. 331-360. The author argues that the European telecommunications market is expected to become a unified, competitive market for multimedia services by the end of this century, opening enormous opportunities for service providers.

Dosa, Marta and Anis Yusoff. 1994. "Information and Indigenous Technological Capacity in Developing Countries." Paper presented at the International Federation for Information and Documentation Conference, Tokyo, October 1994. This paper identifies a conceptual framework in which the facilitators and barriers of indigenous research and technology production may be investigated.

Dosa, Marta. 1988. "Information Transfer as Development Assistance." Center for the Study of Citizenship and The Kellogg Project, Occasional Paper Series. Syracuse University, May 1988. This paper is a call to citizens and educators to recover the subtleties associated with the idea of being informed. It argues that information policy is political cultural policy. Hence, information as development assistance is neither only technical nor merely a neutral helping hand; it is a catalyst for social change and a handmaid of social control.

———. 1985. "Information Transfer as Technical Assistance for Development." *Journal of the American Society for Information Science*, Vol. 36, No. 3, pp. 146-152. The article outlines trends in development assistance strategies and their effect on the information needs of developing countries. It describes the information-related factors to be considered by technical assistance projects and their implications for developing countries.

———. 1980. "Issues of Information Utilization and Dissemination in Technical Aid Projects." Local Revenue Administration Project, Syracuse University, 1980. Examines two areas of information activities: information support to a local revenue project and information support to local participants in order to facilitate their involvement with development decisions. Primary data problems, decision support systems, and pertinent information systems and services in developing countries are discussed.

Drahos, Peter. 1995. "Information Feudalism in the Information Society." *The Information Society*, Vol. 11, pp. 209-222. Drahos tells a pessimistic story about technology based on the assumption that a small number of states will dominate the emerging international regulatory order. The story takes the form of an imagined history of the information society to the year 2015. The conclusions draw some parallels between information society and the feudalism of the dark ages.

Elam, Joyce, et al. 1989. "How U.S. Cities Compete Through Information Technology: Securing an Urban Advantage." *The Information Society*, Vol. 6, pp. 153-178. Article describes how US cities are affected by the new challenges brought about by global telecommunications. It summarizes some of the key technological and policy issues involved. Case studies are reported from Boston, New York, Omaha, and Heathrow, Florida.

Elmandjra, Mahdi. 1985. "Communication, Informatics and Development." *Development: Seeds of Change*, 1985, No. 1, pp. 3-5. Argues that the information revolution is not a panacea and that it may at first raise more problems than it solves. Nonetheless, it suggests that information has become a key strategy for development.

Financial World. "Ranking the Cities." March 14, 1995, pp. 50-71. Ranks the top 30 U.S. cities in quality of several functions including information technology.

Finkelievich, Susana. February 1990. "Innovative Technologies for Latin American Megacities." *Cities*, pp. 65-71. The relationships between innovative technologies and

habitat in Latin American megacities are explored. A survey shows a virtually total divorce between the technology used in urban infrastructures and services, and the needs of the inhabitants.

Griffith, Jane B. and Marcia S. Smith. 1994. "The Information Superhighway and the National Information Infrastructure (NII)." *The Journal of Academic Librarianship*, May 1994, pp. 93-95. The U.S. information superhighway and the NII are discussed. The nine principles for government action are presented and discussion on the following issues is proposed: private sector/government relationship; open access and universal service; privacy and security; intellectual property rights.

Gurwitt, Rob. October 1994. "Innovation by Wire." *Governing*, pp. 52-57. The growing information about state and local government available on line is discussed as well as the limitations to its usefulness.

Guthrie, K. Kendall and William Dutton. Winter 1992. "The Politics of Citizen Access Technology: The Development of Public Information Utilities in Four Cities." *Policy Studies Journal*, Vol. 20, No. 4, pp. 574- 597. Examines the political shaping of decisions concerning technology for computer networks which facilitates public access to community information and dialogue. Comparative study of Santa Monica, Pasadena, Glendale, and Irvine, California.

Huffman, Lisa and Woody Talcove. May 1995. "Information Infrastructure: Challenge and Opportunity." *Public Management*, pp. 9-14. Potential impact of the national information infrastructure on local governments; based on a survey of 1,119 cities and counties in the U.S. ICMA. International City/County Management Association. 1990. "Information Master Planning Sampler." Presents the information plans for Sarasota, Florida; Mercer Island, Washington; and Genesee County, New York. Published in conjunction with Public Technology, Inc.

Jayaraman, Nityanand. 1996. "From Haven to Hell." *Far Eastern Economic Review*. Vol. 159, No. 3, January 18, 1996. Discusses the announcement by the Karnataka Electricity Board in Bangalore of a 30% power cut for small industries. Entrepreneurs say they frequently suffer brownouts of 12 hours a day, forcing nearly 60% of the factories to scale down production.

Jayaraman, Nityanand, Jonathan Karp and Aparisim Ghosh. 1996. "Gloom Town." *Far Eastern Economic Review*. Vol. 159, No. 3, January 18, 1996. Discusses how Bangalore attracted investment in the eighties due in part to climate, low cost of real estate and abundance of highly skilled labor. It shows how today the city is better known for what it does not have: water supplies are chronically inadequate, pedestrians are regularly knocked off roads with cars and scooters, and companies must rely on their own generators for electricity.

Kirby, Andrew. 1995. "Cities: A research agenda for the close of the century." *Cities*. Vol. 12, No. 1, pp. 5-11. Urban areas are seen as the most efficient spatial arrangements

in which to support people as population continues to grow. Fourteen “cities” issues of interest to urban researchers are briefly discussed. They include “cities, capital and construction”; “cities and the planning process”; “management and the political process”; and “cities and public/private space.”

Koniger, P. and K. Janowitz. 1995. “Drowning in Information, but Thirsty for Knowledge.” *International Journal of Information Management*, Vol. 15, No. 1, pp. 5-16. The article addresses the lack of structure in information which is seen as the reason for the growing inability to cope with information today. Four structuring dimensions are suggested for use by producers and consumers of information to profit more fully the growing mass of information: selection, time, hierarchy and sequence.

Latzer, Michael. 1995. “Japanese Information Infrastructure initiatives: a politico-economic approach.” *Telecommunications Policy*, Vol. 19, No. 7, pp. 515-529. Presents an empirical-analytic survey of initiatives toward the Japanese Information Infrastructure (JII) with reference to the aspired-for “Intellectually Creative Society” of the twenty-first century. Various factors are discussed that influence the formulation of JII plans and their realization.

McGugan, Ian. October 1995. *Canadian Business*. Vol. 68, No. 10. Argues that the newest hot spot for the global computer industry is Bangalore and its enormous pool of software talent eager to work for as low as \$1,000 U.S. a month. It claims that the new outpost should help to expand Canada’s already sizable presence in Indian software.

Ovechka, Greg. November 1991. “Raising Revenue with Technology.” *Empire State Report*, pp. 11-14. Information technologies as a source of government revenue in selected counties in New York State are discussed. Increase in revenue is analyzed as it relates to public access.

Páez Urdaneta, Iraset. 1990. “Política nacional de información y modernización del desarrollo: una redefinición del profesional de la información en el Tercer Mundo desde el punto de vista educativo y de la acción social.” Paper presented at the International Federation for Information and Documentation (FID) 45th Congress. The author argues that the relationship between information professionals and the process of developing a national information policy is determined by two main factors: professional training and active participation in professional groups. Both factors play a decisive role in the development of social and political attitudes that enable the information professional to be more effective in his or her functions. The author suggests the need to redefine the goal of information professionals to become active players in the development process.

Plackett, Mark. 1995. “Using Information Technology: Five Case Studies.” *MIS Report*, International City/County Management Association, Vol. 27, No. 6. Five local governments (Kirkland, Washington; Lenexa, Kansas; Pocatello, Idaho; Arlington County, Virginia; and East Baton Rouge Parish, Louisiana) discuss the benefits and obstacles of new office technologies. The process of introducing the new technologies as

well as the feasibility of the new technologies to the needs of the different localities are discussed.

Saxena, K.B.C. and A. M. M. Aly, 1995. "Information Technology Support for Reengineering Public Administration: A Conceptual Framework." *International Journal of Information Management*, Vol. 15, No. 4, pp. 271-293. Authors propose a conceptual framework for reengineering public administration through innovative and cost-effective information technology support to solve the dilemma of improving performance and at the same time making it cost-effective. The framework conceptualizes public administration as policy planning, policy implementation, and policy administration. It proposes a three-tier architecture for support systems for the three aspects of policy management.

Stowers, Genie. Jan 1996. "Moving governments on-line: Implementation and policy issues." *Public Administration Review*, Vol. 56, No. 1, pp. 121-125. Governments are only now beginning to take advantage of new technologies to allow managers and citizens access to up-to-date government information quickly and cheaply. Stowers describes a mixture of traditional hard-copy and on-line documents that can assist public sector managers and academics to understand some of the implementation and policy issues involved in moving governments on-line.

Stremlau, John. Spring 1996. "Dateline Bangalore: Third World Technopolis." *Foreign Policy*, No. 102, pp. 152-168. The emergence of Bangalore as India's "silicon city" is discussed along the lines of increasingly interdependent U.S.-India relations.

Tageldin, Shaden. May 1995. "Local Government Roles and Choices on the Information Superhighway." *Public Management*, pp. 4-8. The territorial disputes and uncertainties of the 'information' frontier are explored. The relationship between local governments and telecommunication giants is discussed.

UNESCO. 1987. "Propuestas para una Política Nacional de Información." Caracas, Junio de 1987. The report describes the results of a seminar sponsored by UNESCO which aimed at drawing proposals for the design and implementation of a national information policy in Venezuela.

United Nations. 1996. A guide for local governments to the City Summit: the Second United Nations Conference on Human Settlements (Habitat II). (Nairobi: UNHCS). Describes the guidelines for Habitat II which will take place in Istanbul, 3-14 June 1996. The goal of the Conference is to make the world's cities, towns and villages healthy, safe, equitable and sustainable. Local governments are sought to be strengthened through capacity building programs for training, management development and use of appropriate technology at the municipal level.

Warren, Robert and Mark S. Rosentraub. Fall 1986. "Information, Space, and the Control of Local Decisions." *Journal of Urban Affairs*, Vol. 8, pp. 41-50. Assesses the balance of control over information between cities and the economic and political institutions city

officials must deal with to plan for the future of their communities. Illustrated by experiences of various U.S. cities.

Zhi, Y.C. and P. Wang. 1995. "Designing a City-wide Information System in the People's Republic of China." *International Journal of Information Management*, Vol. 15, No. 5, pp. 377-388. This paper introduces the background for developing a national city-wide information system as a national pilot in the PRC. It describes the planning and implementation process of a new form of a city-wide information system's architecture and infrastructure.

Zlenziger, Michael. August 1995. "By design." *Far Eastern Economic Review*. Vol. 158, No. 32. Describes how a host of fund managers are betting that a rising tide of innovation will lift Bangalore into the first rank of global technology competitors by the end of the decade.

Notes

* See footnotes 7 and 8 in the text of the report for clarification on the usage of the terms development, developing, and developed throughout the report.

† The Intelligent Cities Project has been supported by the Institute for Electronic Government of the International Business Machines Corporation.

1 ICMA (1990).

2 Huffman and Talcove (1995).

3 Ibid.

4 See *Business America*, February 1995.

5 For an account of Bangalore's rise as a "technopolis" see Stremlau (1996).

6 Stremlau (1996, pp. 152-167). See also McGugan (1995).

7 Development has been a controversial concept for decades. A universal definition able to encompass its complexity does not exist. For our purposes, development means a process of change geared to the eradication of poverty and the encouragement and fostering of self-reliance.

8 What differentiates a developing from a developed country? There is hardly a question able to raise more controversy among development specialists. The term developing is used here in a conventional fashion to refer to those countries which are not believed to have achieved the levels of industrialization found in Western Europe, Canada, the United States, Japan and some countries in the Asia Pacific region. For lack of a better term, we use the term developing being fully aware of its economic simplicity,

knowing that it hides the rich cultural histories and different social and political realities of the countries it purports to represent.

9 See Stremlau (1996); Jayaraman et al. (1996); Zielenziger (1995).

10 See Jayaraman et al. (1996) and Jayaraman (1996).

11 Technological cities can be found on the World Wide Web. For example, see Tsukuba Science City in Japan at http://ccfx.kek.jp/pub/text/tsukuba_city.html ; Singapore at <http://www.ncb.gov.sg/it2k/it2k.html> ; Austin, Texas in the U.S. at <http://www.quadralay.com/www/Austin/AustinHighTech.html> ; and Blacksburg Electronic Village in Virginia, U.S. at <http://www.bev.net/> . A few Science and Technology Parks are also available. See for example the Research Triangle Park in Raleigh, North Carolina in the U.S. at <http://www.trinet.com/tonc/general.html> ; Tecnopolis CSATA Novus Ortus in Bari, Italy at <http://www.csata.it/> ; and the Ryuo-Akasaka Soft Park in Tokyo, Japan at <http://www.suntech.ac.jp/intro/rasp/rasp.html>

12 For example, see Plackett (1995); Gurwitt (1994); Barret and Greene (1994); Guthrie and Dutton (1992); and Ovechka (1991).

13 See Wolfgang Michalski in Jussawala et al., (1989, pp. 9-20).

14 See Hernon and McClure in Schipper and Cunningham (1991, pp. 3-48).

15 See reports by Gazzari, Plate, Guidi and Vetiska in Council of Europe (1992).

16 See Mowlana in Slavko Splichal (1994).

17 Founded in 1957 and headquartered in Rome, Italy, the Society for International Development (SID) has been a leading world wide development forum for people interested in international economic, political, and socially equitable development. SID is the world's largest membership non-governmental organization. SID publishes its own quarterly journal Development, published in Spanish as Desarrollo.

18 Figures taken from Elmandjra (1985).

19 See UNESCO (1985) and Montviloff (1990).

20 See Rondinelli and Cheema in Rondinelli and Cheema (1983).

21 Griffith and Smith (1994); Hernon and McClure in Schipper and Cunningham (1991).

22 Lesser and Vagianos in Schipper and Cunningham (1991).

23 For a full description of Singapore's IT2000 on the WWW see <http://www.ncb.gov.sg/it2k/it2k.html>

24 Curwen (1995).

25 See Montviloff (1990, p. 7).

26 Ibid. (p. 11).

27 Ibid.

28 Ibid. (p. 12).

29 See Leonard and Mara in Schipper and Cunningham (1991).

30 Ibid.

31 Ibid.

32 See UNESCO (1985) and Montviloff (1990).