The Information Revolution Comes to Africa

by Ernest J. Wilson III

Is the information revolution coming to Africa? As with many other questions about Africa, the answer is "Yes, but . . . ." It is coming slowly, ambiguously, and unevenly. In some nations (e.g., Senegal and Mozambique), the government is allowing local entrepreneurs and nongovernmental organizations to "fast forward" into the information future. In others (e.g., Congo and Cameroon), government stands in the way of reform.

Quantum Leap or False Start?

It is easy to find instances of good news concerning Africa and the information revolution:

- Through HealthNet, clinic patients in rural Kenya have better health care because they can consult by satellite with doctors in Nairobi and, if necessary, with specialists in Boston.
- As a consequence of media liberalization, rural audiences in Mali and Niger get more information and better entertainment, as dozens of private and community-owned radio stations are created that cater to consumer tastes and interests.
- Impatient African entrepreneurs, instead of waiting for government action, have created their own commercial Internet access businesses in Senegal and Ghana.
- Pinpointing the position of southern African trains via Transtel satellite data and voice networks permits faster and cheaper deliveries of goods.
- A women's craft cooperative in Kenya learns through its use of Internet advertising that it can charge $15 for units it was intending to sell for $1.
- The South African information sector is exploding with everything from continentwide Internet and cable services to self-supporting

commercial "telephone shops" that give rural farmers access to cellular phones.

But there is bad news as well. Part of the problem arises from low per capita incomes and a lack of telephone facilities. With 12 percent of the world's population, sub-Saharan Africa has only 2 percent of its telephone lines. According to South African First Deputy President Thabo Mbeki, there are more telephone lines in Manhattan or Tokyo than in all sub-Saharan Africa.

Much of the bad news, however, appears to be the result of poor technical and financial management and other inefficiencies on the part of the telephone companies, and the policies and politicians that constrain them. African telephone companies are far from unprofitable; their average revenue per main telephone line is $1,225 as compared to only $735 for the world as a whole. Where do the revenues go? Most of the funds are used to service business and government customers in big urban areas. The public telephone operators (PTOs) provide lip service to the goals of meeting rural needs, but not much telephone service. The investments that the PTOs do make are not particularly efficient or productive. The average investment cost per line in other developing countries is about $1,500. In Africa it is a whopping $5,600, yet the growth in network capacity in the sub-Saharan region has lagged, amounting to only 6.8 percent annually between 1983 and 1992, in contrast to 10 percent in other developing countries.

Conditions are similar with regard to computers, software, publishing, the Internet, and other elements of the information revolution. For example, some African governments impose stiff import barriers on computers, treating them as luxury goods rather than a key part of the infrastructure for economic modernization.

Will the good news swamp the bad, or vice versa? Will the information revolution be another false start in Africa, or will smart governments use the new technologies to leapfrog into the future? If African governments simply do little or nothing they will fall behind, because many Asian and Latin American countries are making haste on the information superhighway, actively competing for information investment dollars and trade.

Hard Choices Ahead. African governments are trying to sort through the tangle of policy issues that confront all countries today in the information arena. The outcome can be a win-win situation if all the stakeholders—developed-country governments, the private sector, and multilaterals—take into account the constraints upon senior African decision makers. Aside from ideology, perhaps the most important "real world" question is: "How should the president, prime minister, or telecommunications minister allocate senior-level attention and scarce financial resources to act on this global revolution in ways that advance his country's interests?" More broadly, what is the best strategy for advancing all the stakeholders' interests in the world's poorest but fastest-growing market for information and communications services (ICS)?

Most of the responses are thus far ad hoc and piecemeal; few African countries have produced a truly national information strategy that transcends the telecommunications sector to address computer hardware/software/systems, publishing, the Internet, and other segments of the ICS spectrum.

Only a few years ago African governments did not need to think about an ICS strategy because that sector required few policy choices. Virtually all countries had strictly state-owned monopolies that forbade foreign or private participation. Information technology was well known and stable. The main choice for a government was what telephone equipment to buy. Telephone rates were set high and the PTOs accumulated big surpluses that could be shared with the national treasury. Powerful domestic interests developed around these state monopolies and their generous surpluses.

Rapid technological changes, tight budgets, globalization, and cutthroat competition are now forcing tough choices onto the African agenda. To improve international links, should the relevant ministry invest its country's money in underwater fiber-optic cables (a solution pushed heavily by AT&T's Africa ONE)? Or should it focus on satellite communication and buy into the Iridium or Inmarsat ICO satellite systems? To upgrade telephone service, should it let competition into the sector, and if so, by finding a strategic partner for the PTO or by offering licenses to private cellular companies? Should it first seek money from the International Telecommunication Union's WorldTel or the World Bank's infoDev? Is the Internet just for the rich? And what is the Internet, anyway?

The broader issues were well stated by a senior Ethiopian information official at a February 1995 meeting in Cartagena of the UN Commission on Science and Technology for Development: "My ministers are sympathetic to computers and computer literacy. But what do I say when they ask me whether we should spend $200,000 for computers or $200,000 for cotton swabs for hospital clinics? Is it health care or computers?"

Resolving these issues effectively requires many of the same changes needed to resolve other economic and political problems in Africa: improved institutional efficiency, greater transparency in policy processes, enhanced training, regulatory reforms. There is no single magic bullet in information and communications services. No one approach or single technical system will solve Africa's information underdevelopment.

With regard to improving information and communications services for citizens and consumers, the single most important challenge now facing African governments is to develop a strategy and a decision calculus that permits overburdened and underinformed senior officials to make rational trade-offs and seek synergies among distinct, complex, and sometimes contradictory technical systems.

Some innovative steps are already being taken to improve decision making. A High-Level Working Group of the UN Economic Commission for Africa recently issued a progressive white paper urging African governments to use ICS to advance education, health, agriculture, commerce, and other consumer sectors. PADIS (a pan-African information service based in Addis Ababa) helps link 18 African institutions in a FIDOnet-based system. Across the continent in Dakar, the Panafrican News Agency, with support from UNESCO and the French overseas research network OSTROM, provides Africa-oriented news content,

using conventional as well as very small aperture terminal (VSAT) and Internet channels.

But beyond the usual bilateral and multilateral programs, the most hopeful and important news is that the foreign private sector is aggressively pursuing sales and investment opportunities across the continent. And African entrepreneurs are jumping into all these emerging markets—from pagers to cellular telephones to private broadcast stations.

The "Berlin Wall." There could be even more innovation and entrepreneurial activity. However, a kind of Berlin Wall runs through Africa, separating information consumers from information suppliers.

On one side of the wall are millions of Africans literally standing in line, more than willing to pay millions of dollars in the aggregate to get telephone service. (The official wait for telephone service is between three to five years in many African countries, and up to 10 years in still others.) On the other side of the wall are international and local companies willing to invest billions of dollars to get access to African customers.

Willing customers on one side and willing suppliers on the other. What's wrong with this picture? The short answer is: a barricade of outdated regulations and governmental fears of the political consequences of liberalizing information.

This thick and gnarled barrier has left Africa in a disadvantaged position in world ICS markets. The continent has the lowest telephone penetration rates in the world. The average for developing countries is one telephone line for every 120 people; for Africa it is one line per 235 people. Some 4 million people (one-third of the subscriber base) are now on official wait lists for telephone service, and the number is growing by 7 percent annually. In order to place telephone calls from one African country to another or beyond the continent, PTOs must pay European telecommunications companies around $400 million annually just to route the calls from Africa to Europe and back to Africa again. This sum is equivalent to about two-thirds of all the development assistance the United States provides annually to the sub-Saharan region.

A consequence of such shabby infrastructure is that the provision of such essentials as health, transportation, effective and transparent governance, banking services, and university education is being retarded just as computer- and telecommunication-assisted services are taking off in other developing countries.

Needed: A Balancing Act. In essence, the global information revolution is about delivering more information faster, cheaper, and more conveniently "anytime, anywhere, in any form."

In developing strategies to bring the information revolution to Africa by creating truly national, integrated information infrastructures, the continent's policymakers confront a difficult conundrum. They must nurture the development of highly sophisticated, world-class channels capable of carrying the digitized content that now races through the world's financial systems, educational institutions, and business networks. At the same time, they must carefully address the information needs of the vast majority of the continent's population, who are poor, rural, and illiterate. In oversimplified terms, Africa must simultaneously accelerate its use of high-tech and low-tech information services.

This requires that African governments embrace four major shifts that are occurring globally: (1) from public to private, (2) from monopoly to competition, (3) from a supply-driven orientation to a demand-driven one, and (4) from domestic-only to more foreign participation in ownership and management of different market segments.

Because these changes are so fundamental, so fast, and touch on so many different market segments and major political and bureaucratic interests, managing them would be difficult under the best of circumstances, let alone in underdeveloped countries that lack strong policy institutions and experience in promoting private companies.

Private-Sector Initiatives

Private-sector interest in Africa's ICS markets should not be underestimated. For the entire African market, the U.S. Department of Commerce estimates that sales of telephone equipment and services add up to about $1.5 billion per year. According to a senior manager at a large multinational company, African markets, although starting from a low base, are among the world's most rapidly rising. The average annual growth rate for telephone main lines in Africa is now higher than in either Western Europe or North America, around 8 percent according to the International Telecommunication Union (ITU). Six African countries have per annum main line growth rates of over 15 percent and teledensities (telephone lines per capita) of over 12 percent, including Gambia (19.9 percent, 16.9 percent), Botswana (16.1 percent, 19.9 percent), and Egypt (15.7 percent, 12.9 percent). Telephone demand in Angola has so outstripped local PTO capacity that there are more customers with cellular telephones than are connected to the national wired telephone system. IBM estimates that sales for its personal computer products alone are growing at 80 to 100 percent annually.

Considerable capital will be needed to meet African ICS demand. The ITU estimates that 1990-1992 telecommunications investments in the sub-Saharan region were about $800 million, or only 3.7 percent of gross fixed capital formation. This amount needs to more than double if government, residential, and business requirements are to be met. The U.S. Department of Commerce estimates that for Africa to reach the minimal levels of other developing countries, the telecommunications sector will require $7-10 billion over the next five years. If African countries want to

develop their information infrastructure, they will need to supplement their own internal earnings with substantially higher private investment flows, particularly in light of the fact that telecommunications funding from the World Bank has dropped substantially from its highs in the 1970s. The International Finance Corporation (IFC) estimates that through the 1980s and into the 1990s the sources of funds have been 65 percent official, 25 percent internal, and only 10 percent private. The IFC estimates that the percentages in the coming years should be closer to 30 percent, 20 percent, and 50 percent respectively. Still, private money has long been available; between 1987 and 1992 close to $14 billion in equity capital was raised on international markets through privatization of state-owned post and telecommunications enterprises. The challenge for African governments is to develop strategies to attract a portion of these highly mobile investment funds.

In addition to the sale of switching and other telecommunications equipment, European and U.S. companies are becoming increasingly involved in other market segments, from international satellite and undersea cable services to cellular telephones to cable television and the Internet.

Not surprisingly, non-U.S. firms are active in Africa, especially French and British companies (e.g., France Telecom, Alcatel, and Cable & Wireless), but also German companies such as Siemens. Japanese companies are engaged too. Mitsubishi is installing a new digital backbone microwave radio system in Zanzibar that will link the island with Dar es Salaam and Dodoma, via a project funded by the World Bank's International Development Association.

International Links: Satellite and Cable. Perhaps the best known of the international initiatives is AT&T's $2 billion Africa ONE project—a plan to encircle the continent with 39,000 kilometers of fiber-optic undersea cable. This would permit direct contacts among African countries and easier trans-Atlantic calls. The project was launched by AT&T after a 1993 appeal by the ITU, concerned about Africa's continuing information isolation. The financial package for Africa ONE has been murky and surrounded by some misunderstandings. AT&T is not proposing to finance Africa ONE only with its own internal funds and has spent much of 1995-1996 trying to mobilize capital from other sources (including the World Bank, the African Development Bank, and various U.S. government agencies). AT&T has also reportedly approached more than 40 African countries individually to ascertain their interest in using the facility. Each participating coastal country would be responsible for establishing links between the cable and its own system. AT&T has also signed a memorandum of understanding with the Regional African Satellite Communications Organization (RASCOM). According to RASCOM officials, the agreements are not fully binding at this point and ongoing negotiations are still exploratory. RASCOM's negotiating strategy (as to what it wants to squeeze from AT&T in return for its support)

is not yet clear.

Africa ONE has several potential undersea cable competitors. The U.S. regional telephone company NYNEX (which recently agreed to merge with Bell Atlantic) is building a $1.5 billion 23,000-kilometer cable between Britain and Japan, with a landing proposed in Egypt to be managed by ARENTO, a local company, with connections in Suez, Alexandria, and Port Said. This initiative, known as FLAG (Fiber-optic Link Around the Globe), includes as partners Gulf Associates (United States), Dallah Albaraka Group (Saudi Arabia), and Marubeni Corporation (Japan). After the main east-west line is constructed, FLAG could develop connections to the primary line, north and south on both sides of the continent. According to NYNEX executives, however, this is possible but not yet planned.

A third international initiative is being assembled by the French state company Alcatel, which is planning an undersea cable between France and Morocco. There was some discussion of a subsequent extension of cables down Africa's west coast to link francophone countries, but this is much less likely in the wake of Alcatel's surprise move to buy 40 percent of AT&T's Africa ONE. In addition, its SEA-ME-WE 2 cable linking Asia and Europe may land in Egypt.

Not to be outdone are the South Africans, already major players across the African continent in the ICS business and with substantial ambitions for the future. Their SAT-2 undersea cable link between South Africa and Western Europe has been operational since 1993 and a SAT-3 undersea cable for international services to West African countries is now being considered. South Africa has subregional ambitions as well, hoping to route international traffic originating in other southern African countries through its own system. (Most of its international traffic is carried via an INTELSAT satellite earth station near Pretoria.) In fact, South Africa has become a major communications player and its role in international transmissions, publishing, cable, and other services will grow dramatically over the next decade. It is already the Internet capital of the continent.

African ministers can choose not only among competing undersea cable projects to meet their needs for international communications, but also between undersea cable and orbiting satellites. (Unfortunately, little research has been done anywhere to analyze the potential trade-offs or synergies across channels.) Intermodal and intramodal competition in Africa is heating up as satellite services expand. The main supplier, INTELSAT (an intergovernmental association), still has by far the largest share of the market, but it is being challenged by private companies such as PanAmSat, which now has two "birds" serving Africa. Other private-sector competitors doing business in Africa include Intersputnik and Arabsat.

A more controversial medium-term venture interested in Africa is the Motorola-inspired international consortium Iridium, which intends to offer voice transmission globally, including to Africa. Instead of sending message units

through glass cables undersea, Iridium proposes reaching its customers via 66 nonstationary satellites in low earth orbit (LEO) that would permit truly global communications using hand-held devices from any spot on earth. This satellite system would complement both terrestrial wireless and landline networks; the same Iridium telephones would be able to interconnect with the local telephone cellular system and the global Iridium system.

Meanwhile, Inmarsat has drawn up plans for an "intermediate circular orbit" (ICO) global satellite network that would serve hand-held terminals beginning around the turn of the century, to be implemented by its new private arm, ICO Global Communications.

Yet another global system has been proposed by Teledesic, a company created by Bill Gates of Microsoft and Craig McCaw of McCaw Cellular (purchased by AT&T for $11.5 billion in 1994). Teledesic's target is different from that of Iridium and Inmarsat—not voice, but high-bandwidth data transmissions, especially for business and government. Using more than 800 orbiting satellites, this company hopes to capture the emerging global markets for data, reaching distant areas with fiber-optic-like capacities.

Value Added Services: Cellular. While "plain old telephone service" (POTS) remains firmly under the control of the PTOs, private-company access to cellular markets is expanding. According to the head of the Communications Unit of the Economic Commission for Africa, "In 1990 there were only seven African countries offering cellular mobile telecommunications services, namely Algeria, Egypt, Morocco, Tunisia, Mauritius, South Africa, and Zaire. That number almost doubled to 11 in 1992, and by 1994, there were 14 African countries. . . with a total of 278,299 subscribers, with the lion's share being attributed to South Africa (233,000 lines). The number of African countries offering cellular services will have approached 20 by mid-1996" (Dr. Robert Okello, "Developing Mobile Communications Systems in Africa," *Africa Communications*, March/April 1996, p. 22).

Some countries (including Burundi, the Central African Republic, Ghana, Guinea, Madagascar, Namibia, Nigeria, South Africa, Tanzania, Uganda, Zaire, and Zambia) have opted to permit private cellular providers into their markets. (As is the case everywhere else in the world, such lists change quickly.) Senegal, Mauritius, Angola, and Mozambique are also planning private systems. In Zimbabwe, a strange face-off is under way between the Mugabe government and local private African entrepreneurs. The country's Supreme Court has ruled that the national cellular market should be opened to private-sector competition, but the government has thus far managed to avoid complying, and the case is back in the courts.

Indeed, for countries in turmoil, cellular technology (which avoids the high costs of installation and maintenance associated with traditional wired systems) appears to be the way to reach upscale consumers. Some companies (e.g.,

Telecell, based in Connecticut and Virginia) have targeted such countries. With the help of at least $9 million in Overseas Private Investment Corporation (OPIC) loans for a cellular project in Madagascar, Telecell is now active in such troubled locales as Burundi, the Central African Republic, and Zaire.

Although the cellular markets are growing fast, their clientele is the "cream" of the consumer population; cellular connections cost $2,000 in some countries, and customers number only in the thousands. But in places where there are two or more operators (e.g., South Africa and Ghana), competition is driving prices down. In Ghana, for example, the Mobitel company reportedly lowered its connection price from $750 to $100 when a second operator entered the market in March 1995.

Nontelecommunications Private Activity. Any effort to build an information highway in Africa must necessarily focus on telecommunications (wired or wireless), the essential foundation on which most other information services are constructed. But there are private-sector activities beyond telecommunications, including computers, software, and system design and maintenance.

Many international computer and information management companies are active in Africa, including Apple, EDS, IBM, and Oracle. They have targeted both governments (especially ministries of finance) and the growing financial services markets. In addition, because most of the demand for computers in Africa is driven by major multinational corporations such as Coca-Cola and Chevron, all the vendors must pay attention to that market.

The banking sector, whether locally or foreign owned, is an important source of demand growth. A number of African banks are seeking to automate their internal operations. The Reserve Bank of Malawi's Office Automation Project, for example, will introduce 13 new computer networks across the organization; some $200,000 worth of IBM hardware (including 40 Aptivas and 14 IBM servers) has already been ordered. Automated teller machine (ATM) services are also springing up around the continent (e.g., at the Commercial Bank of Malawi). In East Africa, the National Bank of Kenya is set to introduce that country's first ATMs. In West Africa, Barclays Bank has installed ATM service at its main Accra office. Farther south, in Zimbabwe, Barclays has implemented the first phase of a satellite link to connect Harare's 19 branches with one another and with branches around the world. By the end of this year, Barclays anticipates having all 49 Zimbabwe branches and 50 more in Zambia and Botswana on its global network, facilitating deposits and withdrawals in the region.

Not surprisingly, IBM is a major player in Africa's computer markets, and is trying to expand. Following Nelson Mandela's 1994 election to the South African presidency, IBM moved its Africa operations from Milan to Johannesburg, where it now has a staff of 30. That office has responsibility not only for the southern subregion but for

francophone Africa as well (excluding the Maghreb). IBM operates as a minority shareholder through companies in Senegal, Gabon, Côte d'Ivoire, and Cameroon; Zimbabwe and Botswana have wholly owned subsidiaries.

EDS, an information services company with 1995 operating revenues of $12 billion, has also moved into South Africa via a 1995 joint venture with Dimension Data, a local technology company. It uses South Africa as a base to service that country's market and others in the region.

Beyond hardware/software/systems, content providers such as publishers and multimedia companies seem to be slower to enter the African market. Boston-based International Wireless, which recently purchased the Prodigy on-line service, has targeted Africa as an expanding market and has already dispatched staff for a commercial reconnaissance.

Indigenous Private Ventures. Individual African entrepreneurs have seized the initiative in today's changing ICS environment, setting up private companies and supplying information goods and services in private markets. In both Senegal and Ghana, for example, individuals with excellent technical skills and overseas work experience have established computer-related businesses. They are meeting local demand by setting up and servicing computer networks and stand-alone units, often for multinationals, multilaterals, and donor agencies. Nii Quaynor, an Accra-based entrepreneur with a background in Sun computer systems, has set up the region's first local Internet service provider, Network Computer Systems (NCS); he is also the local Internet registrar for West Africa. As Quaynor, echoing other entrepreneurs, explains it, "I just got tired of waiting for the government to set up an Internet node so I did it myself." In Senegal, Sulyman Sall, the founder and owner of Silicon Valley Computer Technology, has fashioned a successful business by providing computer services to multinational companies and agencies. In the ICS arena (as in most other spheres), South Africa is a case apart that is expanding its reach through Africa—its cable company MNET is an example.

The need for continuing policy reform and for stable political frameworks to attract local and foreign ICS investment is emphasized by business people who run into continuing problems. One participant in the West African cellular business complains of uninformed and hostile licensing processes created for pre-digital times; inappropriate frequency allocations; poor interconnection services (for linking cellular phones with the existing network); inadequate and absent regulatory structures; as well as inadequate banking infrastructures, repatriation rules, and limits on ownership rights. Corruption remains a factor as well. These political and institutional problems, rather than any lack of money or technology, constitute the major impediment to giving African consumers greater access to the benefits of the information revolution.

National Initiatives

At the center of Africa's ICS dilemma are the state-owned telephone companies (PTOs). Like other state-owned monopolies in Africa, they are ponderous, expensive, generally provide poor service, and have managers who are extremely protective of their own power and perquisites. It is typically the PTO that maintains the "Berlin Wall" between willing suppliers and willing customers, fearful of losing its privileged position as sole supplier. The major institutional challenge in the information sector is for governments to bite the bullet and take the classic steps to reform this parastatal sector, including commercializing and liberalizing the parastatals, establishing effective regulatory agencies, separating telecommunications from postal services, strengthening the policy capacities of the supervisory ministries, and accelerating training. Some PTO reforms are already under way (e.g., in Ghana and Uganda [in the lead]; Congo, Côte d'Ivoire, Guinea, Madagascar, Mauritius, and Senegal; and a third tier that includes such new starters as Tanzania and Togo).

African countries are pursuing various mixes of strategies, including reforming the current monopoly telephone service provider itself, opening up new markets for enhanced telecommunications services (such as cellular telephony, paging, e-mail, the Internet), and/or addressing important nontelecommunications issues such as policies toward computers ("informatics"). Some governments approach these issues piecemeal, others in a more integrated fashion.

The Telephone-Provider Reform Strategy. States can make choices about commercializing and liberalizing the telephone service provider and whether to reduce its monopoly role by selling part or all of it. They can also permit competition by another large telephone provider. In fact, however, few African countries have so far engaged in even partial privatization or permitted competition in basic telephone services. (One exception to this rule is Mauritius Telecom Ltd., a hybrid entity that is 90 percent state-owned and 10 percent owned by a state bank.)

But some changes are in the works. Ghana is considering a license to a second telecommunications provider. South Africa, in the midst of a major review of the sector, reportedly is considering opening 20 percent of Telkom's equity to a strategic investor. The Botswana Telecommunications Corporation has been effectively commercialized with the assistance of Britain's Cable & Wireless under a management contract. Guinea's Sotelgui also has a management contract (with FCR) and is aiming at privatization and finding a strategic partner.

The Enhanced Services Strategy. As was indicated earlier, many African countries, while permitting little competitive entry in basic services, are offering licenses for private entry into cellular (and, less frequently, Internet) services. In southern Africa, for example, only Angola, Botswana, and Swaziland exclude private participation in cellular services, and they are considering offering licenses

to private operators. In Zimbabwe, the Supreme Court has ruled that the national cellular market should be opened to private providers. Private and foreign ownership is permitted in cellular and complementary services in South Africa. Ghana has awarded two cellular licenses and is considering a third. Nigeria has also liberalized this market segment and in 1992 established a new regulatory body, the Nigerian Communications Commission. (The Abacha regime is now in a major payment dispute with a private cellular operator and has cut off its access to the national system.)

The Informatics Strategy. Unfortunately, few African countries have a serious strategy toward informatics—the application of information processing (computers) to solve problems, especially through local area and wide area networks. Several excellent recent reports (by Canada's International Development Research Centre [IDRC], among others) state categorically that there are no systematic national informatics policies in place. Such efforts as have been made in this field have usually been detrimental to the development of an African computer culture. One IDRC study of five francophone (Cameroon, Congo, Côte d'Ivoire, Madagascar, and Senegal) and five anglophone countries (Ethiopia, Kenya, Nigeria, Tanzania, and Zimbabwe) found interesting differences between the two groups. None of the anglophone countries had elaborated a "plan for the development and optimal utilization of information technology." Although the francophone countries did have such plans, the IDRC's judgment was that they were often counterproductive. In two countries, for example, computer imports were forbidden on the grounds that they contributed to unemployment. Other concerns: high tariffs and difficult customs procedures limited consumer access to computers, virtually no official attention was being given to software promotion, and none of the 10 countries had telecommunications systems that could support a modern ICS sector.

Internet policies in Africa are hit and miss. There is little evidence that governments are helping to subsidize and promote Internet access or make it available to universities and research centers. Only 12 countries (Algeria, Egypt, Ghana, Kenya, Morocco, Mozambique, Namibia, Uganda, Zambia, Zimbabwe, South Africa, and Tunisia) have consistent links to the Internet. These numbers are not surprising when the relevant costs are taken into account. A leased line connection comes to some $100,000 annually, and a node around $800. Regular access for a university professor or civil servant could cost more than a month's salary. Yet Internet access is arguably more essential for Africa than for any other region, especially given the deterioration of African universities and libraries, many of which lack current journals and books. Internet access could help keep African scholars and students connected with current international developments in their fields.

Kenya is the newest addition to the list of African countries with full Internet connectivity. Its Internet site, organized by the African Regional Center for Computing (ARCC) in Nairobi with support from the U.S. National Science Foundation and the British Overseas Development Agency, has a local area network with six terminals and a dedicated leased line rented from the national PTO.

The Broadcasting Strategy. Broadcasting may be one of the most important components of an African "national information infrastructure" (NII), especially in countries with low literacy rates. Although a recent BBC survey concluded that there are only about 106 million radios in all of Africa, radio nevertheless reaches far more people than telephones and provides tremendous opportunities for widespread public education and civic development. (In 1994, the dark side of broadcasting's power was manifested when stations in Rwanda broadcast hate messages urging Hutus to murder their Tutsi fellow citizens.) Some interesting initiatives are under way in the areas of broadcast content, station ownership, and improved access to radio technology. Several Sahelian francophone governments have substantially liberalized ownership and control of the airwaves, permitting new privately or communally owned radio (and in some cases television) stations. Mali, for example, has 23 nongovernmental radio stations, including stations in rural communities that broadcast information on health, market prices, and education. Meanwhile, a South African company has invented a windup radio without batteries that will sell for about $20. Once wound, the radio can receive for about 45 minutes and is excellent for rural areas where obtaining batteries is difficult and expensive.

Regional, Bilateral, Multilateral Initiatives

There are a number of new international initiatives in ICS either directly aimed at or relevant to Africa. These include regional, bilateral, and multilateral programs.

Regional Projects. In 1995 the UN Economic Commission for Africa formed a High-Level Working Group on Information and Communication Technologies to prepare a framework to which African governments could refer as they develop their own NIIs. The strength of the working group's report, which was approved at the May 1996 meeting of the ECA Conference of Ministers in Addis Ababa, lies in the breadth of its coverage of the supply side (all ICS industries, not just telecommunications) and its serious consideration of the demand side (recognizing that African NIIs must meet local demands for improved transport, health, education, national integration, and other needs).

Other regional bodies active in the ICS field are the Pan-African Telecommunications Union (PATU), the Pan-African Development Information System (PADIS), the Panafrican News Agency (PANA), the Regional African Satellite Communications Organization (RASCOM), and the Union des Radiodiffusions et Télévisions Nationales d'Afrique (URTNA).

U.S. Bilateral Projects. While the heyday of U.S. bilateral support for basic infrastructure is past, there are several official U.S. initiatives that bear mentioning. These are targeted more on training and liberalizing the policy environment than on directly financing trunk lines and switches. Vice President Al Gore and his team of people scattered throughout the administration are the main drivers of the Clinton administration's information policies.

The touchstone of all U.S. initiatives around the world, whether pursued through the U.S. Information Agency (USIA), the U.S. Agency for International Development (USAID), the Department of Commerce, or other entities, is the set of five principles put forth by Vice President Gore during his March 1994 speech to the ITU World Telecommunication Development Conference in Buenos Aires. These five points—(1) encouraging private investment, (2) promoting competition, (3) creating a flexible regulatory framework that can keep pace with rapid technological and market changes, (4) providing open access to the network for all information providers, and (5) ensuring universal service—guide U.S. policy in all areas and all forums. Initially greeted skeptically even in Europe, the Gore principles are an especially tough sell to many African PTO officials who fear such steps would terminate their state monopolies and result in foreign control of the national media. Still, more and more African governments are moving to accept these points and override PTO objections.

Different U.S. agencies pursue the Gore agenda in different ways. The Departments of State and Commerce, the Federal Communications Commission (FCC), and the Office of the U.S. Trade Representative engage African governments in policy dialogues in bilateral and multilateral forums on opening their markets and supporting the five principles. USAID supports training, policy reform, and promotional programs. For example, USAID's five-year Southern Africa Regional Telecommunications Restructuring Program (with Price Waterhouse the main contractor) aims to provide management and technical education in the subregion, to resolve policy and regulatory issues, and to implement sector improvements and increase U.S. companies' access to information and business activities in southern Africa.

The Office of the U.S. Trade Representative has advanced the Gore agenda by pressing governments to liberalize and open their telecommunications markets. In addition, the Office of Science and Technology Policy and the National Economic Council have played surprisingly (and probably unprecedentedly) active promotional roles in urging U.S. and multilateral attention to African information needs.

Especially noteworthy has been the support by White House officials for formal U.S. participation in the Africa Internet Forum (a loose association of U.S. agencies, including USAID and the National Aeronautics and Space Administration [NASA], as well as the UN Development Program and the World Bank) and for the Leland Initiative (named after the late Representative Mickey Leland, who was a strong backer of Africa programs and died in a 1989 plane crash in Ethiopia).

Administered by USAID with close State Department cooperation, the Leland Initiative is designed to help bring full Internet connectivity to as many as 20 African countries. The target funding is $15 million over five years; first-year (1996) support is $2 million, most of which is slotted for detailed country review missions to select overseas and U.S. partners. The Initiative aims to encourage a favorable policy environment for Internet connectivity, to nurture a sustainable local Internet service provider (ISP) industry, and to enhance development-oriented applications of the new technologies.

Other agencies have undertaken various activities in support of the Gore ICS agenda. To promote U.S. sales and investment in the African ICS arena, some agencies (e.g., the Trade and Development Agency) provide money for feasibility studies, offer loan or investment capital (OPIC), or help make commercial contacts (Department of Commerce). USIA broadcasts radio and television programs (WORLDNET) to advance these same goals and brings African journalists and government officials to visit U.S. ICS institutions. Visiting delegations of African information and communications officials regularly meet with FCC officials to discuss ways to design regulatory agencies.

Multilateral Projects. The World Bank has developed a new strategy that has direct implications for the African information sector: (1) It has shifted away from lending for stand-alone telecommunications projects—a break from its past role as an important supplier of capital for developing-country telecommunications. Private-sector investors, banks, and companies have become the major suppliers of capital, thereby reducing the need for public funds. (2) In lieu of lending, the Bank is now emphasizing information and communications advice and consulting services to governments. (3) It is expanding its capacity to advise on informatics and reducing its expertise in traditional telecommunications. (4) It is increasingly making loans in support of what might be called "embedded" informatics/ communications—that is, ICS improvements carried out, for example, under the aegis of a transport sector or health sector project that requires computers and effective nationwide and international communications links.

A new mechanism for this revised Bank strategy is "Information for Development" (infoDev), which aims to mobilize private and donor capital to support cutting-edge ICS activities that demonstrate good policies and innovative applications.

The ITU is another important player in Africa's attempt to harness information and communications for national purposes. Its Telecommunication Development Bureau works extensively with African governments. *Telecommunication Policies for Africa*, a report years in the making and recently tabled in Abidjan, is an ITU product. As the

creature of state-owned PTOs, the ITU shares their strengths and weaknesses. It has recently created WorldTel, a financing instrument designed to mobilize up to $30 million in private investment capital for countries with a 1 percent or less telephone penetration rate, which includes most of Africa. The ITU wants to use its good offices to encourage private foreign investment in the telecommunications sectors of poor countries. Its survey of developing-country officials found they especially wanted more timely and flexible financial assistance not tied to particular equipment suppliers, as well as more reliable, unbiased information on technology and "best practices."

Although both the World Bank's infoDev and the ITU's WorldTel have received extensive international publicity, neither is fully up and running, so it is difficult to evaluate their actual impact on African nations. They both hinge on extensive, and untested, cooperation among private firms, donor agencies, and developing-country governments. The proof will be in the pudding. They are in principle complementary—WorldTel funds hardware and infoDev funds mainly softer policy and promotional/demonstration projects.

At a February 1995 Brussels meeting of G-7 ministers on the "Information Society," South African First Deputy President Mbeki challenged the developed countries to consider the information-age have-nots and to attend a meeting in South Africa to discuss ways to advance developing-country interests. This invitation was accepted, and the subsequent May 1996 Information Society and Development (ISAD) conference, hosted by the Mandela government and attended by 14 other African countries, addressed most of the key themes of North-South and South-South cooperation in the information sphere. There were, however, real policy differences between representatives from developed and developing countries. And, as with other recent international initiatives, most of its impact is yet to come.

Nongovernmental Projects. Somewhere between official national/international activities and the strictly commercial/profit-driven efforts of individual firms are several innovative initiatives to improve the quality and quantity of Africa's participation in the global information infrastructure (GII).

The international Internet Society plays an active role in training African operators and its annual conferences devote attention to Internet opportunities in developing countries.

The Global Information Infrastructure Commission is an international organization of CEOs from 40 of the world's leading ICS companies plus selected senior government leaders whose purposes are to advance private-sector leadership of the information revolution, to promote greater developing-developed country dialogue, and to help disseminate "best practices" of policy and information applications. African members include business people from Senegal and South Africa and a senior government official from Egypt. A continentwide conference is planned for late 1996 to address institutional and commercial as well as technical challenges to Africa.

Also private-sector-oriented is AFCOM International, which publishes *Africa Communications* magazine and holds an annual conference that brings together several dozen ministers and senior ICS officials with private companies interested in trade and investment in Africa. The head of AFCOM, Dr. Raymond Akwule of George Mason University (Fairfax, Virginia), targeted Internet use this year and provided hands-on instruction to more than a dozen African ministers at the organization's June conference.

In Sum

The most important challenges faced by Africa in the information sphere are political, institutional, and regulatory rather than financial or technical. African and foreign businesses are waiting to invest. Consumers are waiting to pay to communicate with their families, their neighbors, their fellow employees, and their suppliers. They are all being held back by hostile and outmoded political and regulatory constraints.

If these constraints are mitigated, all the stakeholders can gain from the information revolution. African leaders need to find ways to transform the current zero-sum, win-lose situation into a win-win situation. What conditions could change if this is achieved?

- Government officials could see net telecommunications revenues rise as more customers are connected to the national network, even if the amount earned per customer declines.
- African rural consumers could see telephone and other services expand, as they have in South Africa, Ghana, and many Latin American countries.
- Local and foreign businesses that are mainly information and communications consumers could gain the reliable service they need to compete nationally, regionally, and globally.
- Local firms in the ICS supply industries could gain outlets for their money and energies.
- Net employment would likely rise in the ICS sector (even though it probably would decline in the PTOs).
- Social and educational services could be enhanced in both urban and rural communities (e.g., distance education, agricultural extension support).

To arrive at a positive-sum, win-win situation, the various stakeholders can pursue the following strategies:

African governments need to devise strategies that address the entire ICS arena. They need to think of their mission as not just telecommunications, but creating a truly comprehensive information-infrastructure policy (i.e., one that embraces the full range of consumer interests as well as supplier industries, ensures that the benefits of the information revolution are not limited to the cities, aims at making the country a sophisticated and proactive player in

the emerging global information infrastructure, and is friendly to local entrepreneurs). Reflexive anti-private-sector, anti-foreign-investment policies must be relaxed. To design, implement, and build support for these changes, African governments need to appoint national advisory commissions that include substantial participation by user groups, private-sector firms, and representatives of local communities.

Multilateral organizations must concentrate on providing training for government officials and demonstrating to them the concrete benefits of effective ICS applications and of developing a truly integrated national strategy. Where appropriate, they should fund NII-building initiatives.

U.S. corporations need to recognize Africa as the fast-growth market that it is, be more aware of aggressive European and Japanese efforts to penetrate that market, vigorously seek local partners in ICS-sector joint ventures, and support training and promotional activities.

To enhance U.S. bilateral relations, government agencies must explore more seriously the intersection between foreign assistance and GII priorities. The administration should appoint an interagency and private-public task force to track this issue. This will require tying GII/NII issues to the current orientation of the foreign assistance community (i.e., "sustainable development"). Similarly, with regard to the ICS sector the administration needs to integrate sustainable development issues more firmly with its worldwide promotion of the five Gore principles.

Ernest J. Wilson III has wide experience in both African affairs and information/communications issues. He is director of the Center for International Development and Conflict Management at the University of Maryland and senior adviser for the Global Information Infrastructure Commission (GIIC). In 1993-1994 he served as director for international programs and resources on the National Security Council, where his responsibilities encompassed foreign assistance and international economic programs as well as the reform of U.S. international broadcasting, including Radio Free Europe and Voice of America. He also established and directed the Policy and Planning Unit in the Office of the Director of the U.S. Information Agency. In 1994 he was asked to help create the GIIC, a new private-sector organization of 40 CEOs and government leaders from around the world, including the CEOs of Mitsubishi, Sprint, Cable & Wireless, Telkom South Africa, and Fujitsu. He served as deputy director of the GIIC in 1994-1995.

Dr. Wilson is a consultant to the Economic Commission for Africa's working group on information technology strategies and to the UN Commission on Science and Technology for Development. He organized the first Council on Foreign Relations study group on information technology and foreign affairs. He has also worked on privatization with the African Development Bank, the World Bank, the Organization for Economic Cooperation and Development, private companies, and the governments of Nigeria, Tanzania, Côte d'Ivoire, France, Poland, and Russia, among others. He coedited *New International Information Initiatives: Vision and Public Policy* (MIT Press, 1996).