



Workshop on Information Technology in Africa

Conference Proceedings

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The views expressed in this conference summary are those of individuals and do not represent official US Government positions or views. The National Intelligence Council (NIC) routinely sponsors such unclassified conferences with outside experts to gain knowledge and insight to sharpen the level of debate on critical issues.

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Workshop on Information Technology in Africa Conference Report

Introduction

In October 2001, the National Intelligence Council, in conjunction with the State Department's Bureau of Intelligence and Research, sponsored a conference that examined Africa's participation in the Information Revolution and explored opportunities for African nations to benefit from Information Technology (IT). The purpose of this conference was to explore the African IT landscape from an academic, commercial, and government standpoint. It brought together approximately 60 government and outside experts from Africa, the United States, and the United Kingdom in an effort to develop a baseline against which future African IT developments and needs can be measured.

This interactive day-and-a-half workshop focused on the economic, social, and political impact—positive and negative—that IT is having within Sub-Saharan Africa. The conference centered around five panel discussions with presentations from technical and regional experts. In addition, there were regional breakout sessions—East, West, Central and Southern—which sparked lively debate and sought to create a snapshot of the IT infrastructure in Africa—highlighting successes, identifying pitfalls, and promoting cooperation.

This conference report contains the introductory presentations and a summary of the subsequent non-attributed discussions that followed. Additionally, a summation of the overall discussion, observations, and recommendations from each regional breakout group has been included. The conference encompassed diverse and dynamic opinions; the views expressed in this summary represent the views of individual participants and do not reflect an overall conference consensus, or an official US Government position.

Executive Summary

The last 20 years have been characterized by rapid improvements in information technology and have come to be regarded as the “Information Revolution.” The Information Revolution is changing the speed at which information is communicated, the facility with which calculations can be conducted in real time, and the costs and speed of observation of physical phenomena. Applications of IT in transportation mean that people and goods can be moved more efficiently; applications to the production process mean that goods and services can be produced more efficiently.

In the absence of a well-developed telecommunications infrastructure, many African nations want to leapfrog into modern information technology, participate in the Information Revolution, and close the gap between the “haves” and the “have-nots.” There are now very few places in Africa where one is not within commuting distance of an Internet access point. In many countries there is a powerful success story. Five years ago, only a handful of countries had global systems for mobile communications cellular operators and local Internet access; now

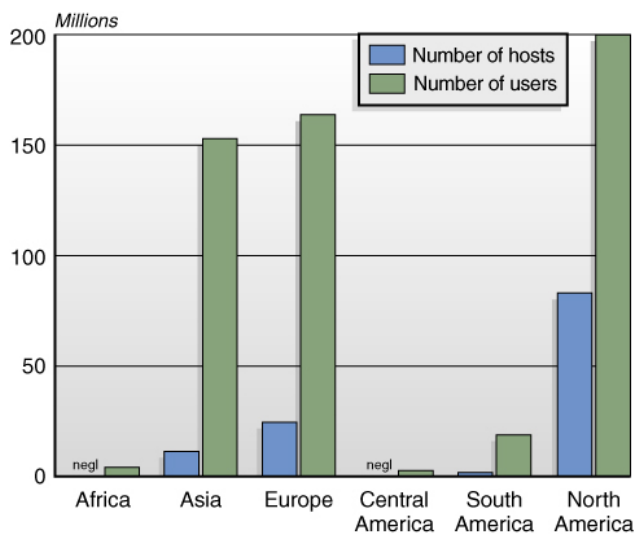
more than 600 Internet Service Providers (ISPs) are operating, including ISPs in all African countries. Now, there are almost one hundred mobile providers—and more mobile than fixed-line subscribers in Africa. Some countries are now moving toward full competition in fixed telecom networks. By some accounts, three to four million PCs have been installed.

Still, Africa’s demand for information and communications remains largely unmet. Less than two percent of world investment in telecommunications in the 1990s was in Africa. Moreover, the IR is sweeping even faster throughout the rest of the world. Although the Internet is not the only technology of the Information Revolution, it is a clear indicator of trends and developments. In 2000, Africa had only 0.22 percent of the world’s Internet websites, lower than three years before.

South Africa has roughly half of the continent’s IT infrastructure. North Africa and Nigeria each have about one-sixth, and all the rest of Africa accounts for only one-sixth of the infrastructure. As one might expect, richer countries are generally more wired. However, the patterns of IT diffusion in Africa are very complex; mobile phone, fixed line telephone, the Internet, telephone revenues, radio and television all show regional differences. Mass media communications—radio and TV—are far more important in Africa than point-to-point communications. For every telephone in Africa, there are 2,500 TVs and 14,000 radios. In 1990, Africa held 12 percent of world population and two percent of the world’s telephones, but 10 years later with a higher portion of world population, Africa had only 0.8 percent of the telephones.

There are still many countries in Africa with policies that impede the full development of IT. The key to IT success in Africa is to find a way to confront relevant policy issues and discover what can be done to remedy them. Four factors have been considered as drivers and impediments to changes: Culture, Competence, Capital, and Control. How do these factors influence who uses IT, and for what purposes, in the economic, social and political systems in these countries? Most importantly, what will be the economic, social, and political implications of the different patterns of use of IT that will be expected to emerge in these regions?

Worldwide Regional Internet Hosts and Users



Economic Impact

Although clearly underfunded on an international scale, the IT infrastructure in Sub-Saharan Africa for business is improving. Telecommunication services are increasingly available, including both basic services and such advanced services as video conferencing and live data streaming. Telecommunication equipment supply is getting better, especially mobile and fixed wireless, as is computer equipment supply for both consumers and businesses. Corporate Internet access is available; business centers and hosting services are serving business customers.

- **Finance.** IT is improving banking and other financial services in countries such as Morocco and Zimbabwe.
- **Business Development.** Opportunities are being created for African enterprises to market teleservices for developed nations. A Moroccan ISP, for example, is currently digitizing France's national archives.
- **Agro-Business.** An example of a successful initiative involved the dissemination of cocoa and coffee prices to farmers in Côte d'Ivoire. The agricultural extension agency based in Abidjan e-mails world coffee and cocoa market prices to its extension agents.
- **Employment.** Information and communication technologies have created new types of jobs, such as those in cyber-café, telecenters, and business centers.

Social Impact

The arrival of the mobile phone has been characterized as a “communication miracle” in remote areas of certain countries, specifically in Côte d'Ivoire. It has also widened telephone access to all social classes; in South Africa, for example, community telephone kiosks in facilities made from standard cargo containers provide wireless telephone service using cellular antennas and cellular pay-telephones.

In non-urban and remote regions, established communal social structures facilitate shared telecommunications and Internet facilities—an African version of the cyber-café—rather than diffuse, individual-owned connections. These facilities can be mobile and connected via satellite to leapfrog the necessity of landlines and distributed power requirements.

- **Education.** There is considerable interest in distance education and training in Africa. The African Virtual University already has fee-paying students on 24 university campuses in Africa who are linked to teachers and libraries worldwide via Internet.
- **Health Services.** The Internet provides health researchers and professionals access to up-to-date research and reference material. It has afforded health workers in cities such as Abidjan, Bouake, and Daloa rapid information exchange, conferencing, distance learning, and access to urgent advice or diagnosis assistance. The Internet allows the dissemination of best practices in fighting against HIV/AIDS. X-rays are being e-mailed in Mozambique, making expert medical interpretation available to patients without travel to a specialist.
- **Empowerment of Women.** IT has opened up many opportunities for women. For example, one of the members of an Ivorian women-in-agriculture network found a call for proposals on the Internet. She developed a proposal for an agriculture project to benefit a group of women farmers in the north of the Côte d'Ivoire, and submitted it via the Internet.

Political Impact

In Côte d'Ivoire, for example, the impact of new information and communication technology on the media was described as “phenomenal.” Local radio can be heard on the Internet; some newspapers are on line and can be read from all over the world, broadening participation in the

political process. Ivorians of the Diaspora can follow events in the country through Internet versions of local newspapers, and they can contribute to political debate via the Internet.

This international availability of information has brought more transparency in the election process. In Côte d’Ivoire’s last election, the parties created websites for the campaign and provided cellphones to their representatives.

Regional IT Overview

The workshop divided into four breakout sessions, each dealing with one region of Sub-Saharan Africa. The participants were asked to discuss the role of IT in conflict, political change, and economic development within each region. They also were asked to consider the interaction between nationalism and ethnic politics, the role of language, and opportunities where IT can benefit each region.

These breakout sessions were to be a continuation of earlier discussions, focusing on specific regions. The challenge was then to address how IT will influence the economic, social, and political paths of African nations.

Southern Africa. South Africa’s well-developed infrastructure, political stability, and good education system have facilitated the diffusion of IT. The value attached to free press and free expression spills over to facilitate greater acceptance for IT diffusion, as does the South African tradition of an independent judiciary.

Telephone Statistics for Côte d’Ivoire

Year	Fixed Phone Lines	Mobile Phones	Population	Ratio of Adoption
1997	142,322	36,005	15,292,000	1.17 %
1998	171,001	91,212	15,854,000	1.65 %
1999	219,283	257,134	16,377,182	2.91 %
2000	240,000	322,500	16,377,182	3.32 %

The legacies of apartheid, however, include an inequitable limitation of considerable intellectual property to the former elite. Some of South Africa’s early experiences in IT, good or bad, are likely to be emulated in other African nations; but other nations may recognize failures in South Africa’s approach.

A few potentially negative impacts were discussed. With increased IT use, financial assets may be more quickly expatriated; there are elements of both investor risk and safety from IT-facilitated movement of assets.

Central Africa. Chronic conflict may explain in part why the Central African Economic Community lags substantially in the number of radios, televisions, telecom facilities, and cellular telephones, *per capita*. Only a thin veneer of elites IT in the Democratic Republic of the Congo (DROC); illiteracy is as high as 70 percent, which will limit the extent of Internet use. The DROC private sector may be willing to invest in connectivity, but foreign investors are likely to be deterred by the risky circumstances.

Increased use of PCs and other ITs in government is a possible part of an effort to combat corruption and to increase transparency. Increased use of short wave, FM and possibly digital radio could facilitate communication and civic education. The Internet can connect civil society

and public sector institutions. However, the media also can be used for propaganda and to encourage genocide (as occurred in Rwanda in 1994) when extremists gain control of the radio.

IT could provide a means for distance learning; given the loss of teachers to AIDS, IT could be critical to filling gaps. Similarly, wireless communication technologies will likely be used for distance medical diagnosis and treatment, as they presently are being used in South Africa.

East Africa. The region is building on Diaspora communities to create very positive advances in IT development. The Eritrean Diaspora, for example, has established many direct links with community-based organizations and community-based umbrella organizations working in regions of Eritrea that are often beyond the reach of the conventional projects and practices of development agents. Through planning and communication software developed in the United States, Eritreans have built a sophisticated planning and support delivery network, making it available to the most remote regions.

In addition, the Diaspora has set up a website that provides otherwise inaccessible news and information that is often critical of the government. The Somali Telecom Group is an example of the leapfrog technologies that are allowing well-trained Africans to return to Somalia and apply their state-of-the-art skills in their regions. The case of Uganda is a good demonstration of the benefits of competition. The Government of Uganda has forced previously monopolistic communications companies to make the price competitive.

West Africa. The Internet is driving competition within the region. Nigeria is by far the largest country and the largest economy in West Africa. However, Senegal and Ghana, both democratic, market-oriented countries, are leaders in the development of IT in the region. On a positive note, there is an educational base and human capital conducive to IT-based development.

Nigeria, for example, has a very low teledensity. The country did open up competition for mobile wireless, and awarded four licenses (\$265 million per license); two companies have begun operating. The growth rate looks promising. The Internet has a fairly strong base in Nigeria, although there is a lack of good international connections. There is a fairly competitive ISP market. However, eighty percent of the people live outside the cities; most telephone lines are in Lagos and those are often non-functional. In the rural areas, travel of 50 km to a pay phone is average. Developing nodes of communication to enable radio to be used to reach the rural population would be useful.

Implications for Policymakers

Africa's use of IT is growing, but at a slower rate than other parts of the world. The biggest change in Africa is the coming to influence and power of a new, globally oriented generation. IT is the ideal vector to support and empower these future leaders.

The privatization of telecom and a competitive market atmosphere will be key to achieving connectivity and low-cost service. The educational system, from primary schools on up, should strengthen efforts from computer literacy training to the conduct of research and experimental

development. “Centers of Excellence” for manpower development are needed everywhere; development of human resources should be included in all plans for IT development.

Donors seem to have focused on Southern Africa, but clear opportunities exist in advanced countries in North Africa. Local applications, such as those in government, deserve more support. Local content and content in local languages should be a priority. Agriculture and natural resource management are critically important but do not receive much support from donors.

Policies should clearly distinguish between countries in which state-owned enterprises are in the IT business, versus those in which government restricts itself to policy and regulation. The former should be encouraged to liberalize; assistance should be provided to the latter in building relevant capacity. Emphasis should be directed to equity issues, including equal access for women, and access for rural and semi-urban areas.

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Opening Remarks

Ellen Laipson

Former Vice Chairman, National Intelligence Council

This workshop is one of a series dealing with the impact of the Information Revolution and other technological advances on US international policy. Assumptions are often made about Africa, but this workshop provides an opportunity to challenge conventional thinking and to raise understanding of ground truth. Africa may not be a story of horizontal diffusion of information technology (IT), but rather a region with pockets of new technology. What are the consequences of this pattern? How do culture, capacity, control, and capital affect the dissemination and utilization of new information technologies in Africa?

Work done on global trends has shown the interconnectedness of many issues; consequently this workshop should use a wide lens to encompass all the relevant factors. The information technology story should be linked to a broader African story. Such an approach will help the National Intelligence Council (NIC) to make use of the insights provided in this workshop.

Since this meeting has been held less than one month after the events of 11 September, participants are urged to think in terms of those events and of returning to normalcy. What impacts will the September attacks have on the topics to be treated in this workshop?

Lane Smith

Coordinator, Leland Initiative, US Agency for International Development

In some ways this workshop is reminiscent of the discussions conducted at the opening of the Leland Initiative more than five years ago. Surely the events of 11 September will push the US Government to do even a better job in getting information technology to Africa. The conference also provides an opportunity for people who know each other only via telephone and the Internet to meet face-to-face.

The Leland Initiative has focused on IT policy and building an IT user base in Africa since 1995. It has had major achievements in enhancing Internet connectivity. There are now very few places in Africa where one is not within commuting distance of an Internet access point. In many countries and places there are powerful success stories, but there are still several places with policy problems, including Côte d'Ivoire and South Africa. The private sector responded very well to the Leland Initiative. It would be helpful in this workshop to look at the progress made under this initiative and to identify ways to reduce the remaining bottlenecks.

Because African leaders have been courageous, they have demonstrated that good policies really work. Thus Nigeria has just auctioned licenses for wireless telephone operators and raised \$1 billion for its treasury. Starting from less than 400,000 working lines, by January Nigeria should have nearly two million working lines. If policy barriers are in place, the private sector gets nowhere. In Ethiopia, for example, there is nothing wrong with the private sector. But the regime has said it is uncomfortable with a strong private sector delivery of these kinds of services. So the policies are critical—they work for or against you.

Panel I: Global Course of the Information Revolution— Overview and Introduction of RAND Model

Dr. Robert Anderson

Head, Information Sciences Group, RAND

Based on a model developed by RAND, this initial session provided the necessary framework to assess how IT will impact Africa and how African nations will utilize IT for their own benefit.

RAND Model—Templates to Apply to Africa

RAND is conducting a multi-year effort, sponsored by the National Intelligence Council, to chart the likely future course and implications of the information revolution throughout the world over the next 10 to 20 years. As a major part of this effort, RAND is holding a series of international conferences on various aspects of the information revolution. Conferences completed to date include:

- Societal Trends Driven by the Information Revolution
(Washington, DC—November 1999)
- Technology Drivers of the Information Revolution
(Pittsburgh, PA—May 2000)
- The Information Revolution in Latin America
(Washington, DC—November 2000)
- The Future of the Information Revolution in Europe
(Limelette, Belgium—April 2001)

In characterizing the IT activity of a nation, it is useful to distinguish among:

- The underlying *technology* (e.g., integrated circuit, UNIX operating system, TCP/IP protocol, and fiber-optic cable).
- Hardware and software *artifacts* developed from that technology (e.g., hardware items such as PCs, laptops, cell phones, Palm Pilots or software items such as spreadsheets, other office automation tools, including Mosaic and Netscape browsers).
- *Services* performed and delivered using these artifacts (e.g., routine software support services, information services available over the web, transactional services such as on-line banking and on-line shopping, and a wide variety of other financial and e-commerce services).

A nation can be successful in the development of IT artifacts without developing the underlying technology. Similarly, a nation can be successful in the performance of IT services without developing either technology or artifacts.

Nations exhibit different patterns of mastery over technology, artifacts, and services. The United States is strong in all three aspects. Finland and Sweden both manufacture artifacts (such as cellphones and wireless gateways) and have strong IT service industries. India is producing software and selling IT-intensive services (such as back-office operations services) internationally but does not have a strong IT hardware manufacturing capability. For developing nations, a likely progression is from developing services, to developing artifacts, and ultimately developing technology.

What may the next 10 to 20 years hold? In technology, we expect exponential growth in computing power for at least another 10 to 15 years, a convergence in communications technologies and a major increase in bandwidth. In artifacts, we may expect to see such developments as:

- Diverse, powerful, inexpensive sensors capable of (limited-distance) wireless communication.
- Ubiquitous computing, with convergence of wireless telephones, personal digital assistants (PDAs), radio, voice and e-mail messaging, smart home appliances, etc.

We can expect to see the elaboration of many new and improved IT services, such as limited machine translation of human languages, robust global information utilities serving a wide variety of needs, e-commerce with billions of customers and millions of businesses, and telemedicine.

The Four Cs

In the previous meetings, participants have focused on four groups of factors that act as drivers of or impediments to change:

Culture, Competence, Capital, and Control.

These have been referred to as “the 4 Cs.” These factors influence a nation’s access to and adoption of information and communication technologies (ICT). They can enhance or impede a nation’s course through the information revolution.

Culture includes many factors: What language or languages are spoken in the country? Is the country linguistically homogeneous and is the principal language globally prominent? If so, will many software packages be translated into that language? Since much of the IT and web-based information is produced in English, are

many of the country’s citizens bilingual? And if so, is that second language English?

Other cultural issues are potentially influential, for example, is the nation or region strongly nationalistic, thereby tending to resist “foreign” influences such as provided by information and communication originating elsewhere? Is the culture of the country or region highly stratified, so that ICT penetration and usage within one stratum is not likely to strongly affect others? Does the country have a stable, viable legal framework, within which such concepts as intellectual property rights, privacy, and patents are legally protected? Are the principal players organized hierarchically, or does the culture foster small, networked, cooperative arrangements among firms? Can business relationships be developed easily outside of tribes, families, and other strong social institutions—based on confidence relationships?

Competence deals primarily with the level of knowledge and skills of the people in the country. Is education in computer and communication-related technologies widely available and does it enable workers to provide goods and services needed within the society itself, without needing to rely on outsiders for production, maintenance, and support services? Are citizens of the country mere consumers of the technology and its artifacts and services, or do they produce those goods and services as well?

Capital involves considering whether there are sources within the country or region itself that provide needed capital for IT businesses, or is it viewed as a good investment by external parties, so that investment capital can flow into the area? Is there an infrastructure that ensures delivery of services, such as electric power and telecommunications, at a reasonable cost to the consumer?

Control, the last of the four C's, has proven to be an especially useful focus for past conference discussions. Under this heading one may discuss both "Agency of Control" and "Form of Control." Is societal control lodged primarily in a government, the military, religious organizations, or the private sector, and is the control restrictive and constraining, or promotional and guiding?

Some "Country Models" of the Information Revolution

It has been useful to classify countries in terms of their place in the Information Revolution (IR). Thus, nations have been classified as:

- **IR Vanguard Nations**—those in the forefront of one or more aspects of the information revolution, creating the new developments and showing the way to those that follow (e.g., United States, Canada, Finland, and Sweden).
- **IR Strivers**—those well along in many aspects of the information revolution, but in most cases following in the tracks of the IR Vanguard nations (Australia, France, Germany, Ireland, Israel, Singapore, Taiwan, and the United Kingdom).
- **IR Slow Movers**—those lagging behind in their information revolution developments, for a variety of reasons (e.g., Japan).
- **IR Late Starters**—many nations of Central and Eastern Europe, and many Latin American nations.
- **IR Veneer Societies**—those in which a small fraction of the society is participating in the information revolution and well into the information age, with the vast bulk of the population still in the

industrial or even the agricultural age (e.g., India).

- **IR Left-Behinds**—those being left behind by the information revolution, for a variety of reasons (e.g., Afghanistan, Burma, North Korea).

In the context of this conference, it will be useful to determine how to characterize various African nations based on their attributes and some of the factors affecting their status.

Applying the RAND Model to Africa: Questions to Consider

In utilizing this framework, it is important to consider which factors are easily manipulated and which factors can be changed to promote quick IT growth. Although much can be explained by poverty, the per capita GDP is not likely to change quickly.

The generic RAND model is intended for global application. The African example is a very useful reminder that the entire world is not Singapore. There is a tendency to look at vertical charts and say the world is being transformed. However, 99.5 percent of Africans are not connected to the Internet. Thereby reminding us, that although the world is being transformed by information technology, the impact of such technology differs widely among regions and countries.

One could arguably say that IT is more important for Africa than it is for countries on other continents. Specifically, Africa's many landlocked countries need portals to attract capital investment, increase exports, provide education, and promote democracy. All of these factors should be considered when employing the RAND model.

Given the timing of this workshop, one key issue will be the impact of the events of 11 September on decisionmakers in the private sector. Will there be a drop in capital flows to developing nations and will the drop for Africa be proportionately greater? What will the impact of 11 September be on foreign assistance and more specifically on donor assistance for IT?

The events of 11 September should focus attention on the importance of the development of democracy. If poor countries are not democratic enough, the United States will feel the repercussions. Thus it becomes important to consider the effects of IT on democratization.

GDP per capita is strongly predictive of Internet penetration (and telecom penetration), but the general poverty of African nations does not tell the entire story. Per capita GDP is about \$400 to \$450 in Zimbabwe, Senegal, Lesotho, and Nigeria; nevertheless, these countries have significantly different levels of connectivity. The differences are extremely important for policy purposes; to understand them, one must look at institutions and key leaders, such as the Markle Foundation, to promote understanding and improvement of e-readiness. Other aspects of culture, such as the existence and tolerance for corruption and the willingness of elites to cooperate among themselves, seems especially important, as does the level of competence within the country.

Panel II: Technology—Where is Africa?

The purpose of this panel was to look at the diffusion patterns of technologies in Sub-Saharan Africa and determine what types of technology are being employed on the continent. More importantly, the development of IT infrastructure in Africa and Africa's IT relationship with the rest of the world were discussed. Many of the points made in this session were thought-provoking, or outside the realm of conventional thinking, initiating a dynamic discussion platform for the conference.

African Information Revolution: A Balance Sheet

Essentially, there are good things going on in IT in Africa. Every country is now connected to the Internet; three to four million PCs have been installed. However, South Africa has roughly half of that IT infrastructure and North Africa and Nigeria each have about one-sixth of the IT infrastructure; the rest of Africa accounts for only one-sixth of the infrastructure. Thus, the majority of Sub-Saharan African countries are very much behind the IR curve.

The patterns of IT diffusion in Africa are very complex; mobile phone, fixed line telephone, the Internet, telephone revenues, radio and television all show different regional patterns. As expected, there is a tendency for rich countries to be more wired than poor countries, but there are significant variations in connectivity among countries at comparable economic levels.

On a positive note, telephones and Internet service are expanding very rapidly, and waiting times for telephone service have gone down. However, it is important to understand

that mass media communications are far more important than point-to-point. For every telephone in Africa, there are 2,500 TVs, and 14,000 radios. Radio and TV are the media of choice to reach great numbers of people; the Internet is being used to feed radio and television broadcasters.

On the downside, Africa is falling further behind the rest of the world in IT. This year it had only 0.22 percent of the world's websites, lower than three years before. Africa is moving fast in acquiring information and communication technology infrastructure, but Latin America and Asia are moving ahead faster. In 1990, Africa had 12 percent of the world's population, but only two percent of the world's telephones. Ten years later, Africa had only 0.8 percent of the telephones. The ITU data on which this statement is based pertains to fixed lines, and the picture probably is different if wireless telephony is included. Still, less than two percent of world investment in telecommunications in the 1990s was in Africa.

Over the 1990s, positive evolution in African IT infrastructure occurred, combining public and private initiatives, balancing centralized and decentralized administrative controls, and involving both domestic and foreign investment. There is a strong sense of gathering momentum and potential for growth caused by the positive effects of knowledge gleaned from increased connectivity. Why did that momentum develop?

The IT revolution is not simply a technological revolution; if that were the case, everyone would participate equally. Rather, the revolution is one of knowledge and politics.

On the Ground: A Consultancy Perspective

Over the last few years there has been a marked change in the characteristics of funding and infrastructure development in the developing world. Standalone project-based work has been replaced by projects that fit within a “program of activity.” For example, an increasing number of projects fit within a framework of “public service capacity building.” This approach prioritizes tasks for the government and sets out funding timetables so that governments and aid organizations work hand-in-hand to achieve goals over much longer periods.

Programs might resemble the following models. The civil service is downsized and the government is tasked with creating a more efficient work force. Information systems are used to create financial management information systems, which allow greater transparency and audit ability. Payroll and personnel systems are created to move away from a manual-based system, and data is cleaned. Business process re-engineering is used to create procedures across government that will lead to inevitable, but positive change.

How does one plan international projects? Supply the most capable and appropriate consultants with multiple skills and sector experience. Academic qualifications do underpin capability, but extensive “hands on” experience is essential. One must use proven techniques for fair procurement, structured development, and project management. Plan to the highest level of detail, but recognize that cultural restraints can and do affect performance. Acknowledge extended development and management project lifecycles. Be aware of and recognize corruption, and use technology to aid its eradication through the creation of tighter

security methods and tighter data input controls.

The impact of HIV/AIDS must not be underestimated when planning projects. HIV is affecting the educated “middle class,” leading to not inconsiderable project impact. Arguably, every family in Africa is affected, either directly or indirectly.

The “Rules of Engagement”

Different countries have different power bases and different agendas, and working in Africa is a continuous learning experience. To refer to one’s experiences in another African country, and to use that model unthinkingly, is as dangerous as it is resented. The level of sophistication within African civil services is high. Never underestimate them. There is a plethora of internationally trained staff, with qualifications from prestigious universities and colleges.

Always remember that in line with African politics the underlying penalties for failure are substantial. A civil servant who has worked his way to the top is usually a politically aware, intelligent, and highly capable individual, with strong connections to other powerful individuals.

African nations are proud and increasingly sophisticated. Most of their educational, social, and legal infrastructures have historical roots. Most senior civil servants have First World education and look for First World solutions, for example utilizing Oracle v11 instead of Oracle v10; Pentium IV technology instead of 486. There is an increasing reluctance by certain African governments for foreign nationals (UK, other European, and US principally) to provide advice and an increasing resistance to “tied” funding.

Africans often do not get first-rate service from international consultants. Consultants build careers in First World markets, and as a consequence, many of the best do not wish to go to Africa. Neither are their fees affordable in Africa, since fee rates are substantially higher in First World countries. Logically it follows that there is an element of consultancy support, just as in the First World, which is not of a high standard. The most significant difference is that in First World countries those consultants are unlikely to be able to make a significant impact on a nation.

Markets for consulting services in developing nations are funded by organizations (DFID¹, USAID, UN, World Bank) that must justify expenditures versus results. One of the principal objectives is continued capacity development in the target country. Supplying consultancies provide documentation and planning advice, and “local companies” carry out implementation services.

Infrastructures in the Developing World

Telecommunications are poor and frequently out of service. The use of copper wiring is prolific, especially in countries engaged in copper extraction. Roaming facilities for mobile First World technologies are limited due to current credit facilities. Roads are generally poor and plumbing, waste drainage, and electricity supplies are intermittent and cannot be relied upon. Money to develop these facilities is not forthcoming due to lack of credit and poorly performing economies.

The developed world remains developed only through a continuous cycle of development and improvement. Funding only provides a piecemeal approach. The piecemeal approach causes projects to fail to deliver completely, leading eventually to continuous revisiting of previously funded sectors. There is little

identifiable coordination among donors. One of the biggest problems is drawing together multinational resources to build systems more quickly, so that the coordinated solution provides the springboard for the nation to begin building systems itself. This lack of coordination is compounded by a tendency to view technology as a solution to all problems—an attitude shared by both donors and target countries.

The UK IT/IS sector strongly advocates the use of structured methods, based upon documented sequences or work programs that form a paper trail. Two examples of such approaches are the Structured Systems Analysis and Design Method and Project Controlled Environments. Involving the client in the decisionmaking process facilitates ownership. Spelling out the ultimate benefit of the solution being delivered also helps.

Reasons for project failure include:

- Differing agendas of senior civil servants.
- Lack of knowledge about stakeholders and influencers.
- Insufficient funding.
- Failure to recognize the impact of technology implementation upon the culture and working practices of the nations.
- Poor project management.
- Lack of flexibility in approach.

The KPMG² Survey (1995) provides some indications of the relative importance of

¹ Britain’s Department for International Development.

² KPMG is an e-business consultant firm.

different causes of project failure. The top six causes were:

- Project objectives not fully specified.
- Bad planning and estimating. Projects take more time in Africa than do European or US projects.
- Technology new to organization.
- Inadequate project management methodology.
- Insufficient senior staff on team. Careers are built upon influence and connections, mostly family formed, and as such the most capable individual with no influence is unlikely to achieve a senior position.
- Poor performance by suppliers of hardware or software. This is very common. Local suppliers are installing the very latest technology, which frequently is not supported in the major market places, due to lack of skills in that software or hardware arena.

In summary, infrastructure—telecommunications, roads, utilities, etc.—in Africa is poor and is likely to remain so for some time. UK and US infrastructures have been constructed over centuries. Africa is trying to catch up with a developed country ideal, which is itself moving away at a still faster rate. Africa needs the top-level assistance that the wealthiest banks and governments can buy, not the skills that are attracted by the reduction in competition. Illness, HIV in particular, will inevitably have a negative impact upon long-term sustainable development. A route for “catching up” with the First World would be to move immediately from fixed landlines to mobile telecommunications or satellite, but it is dependent upon nation states having sufficient

funding resources to develop in the first place and then having sufficient funds to continually evolve.

Project Africa

The purpose of this project is to develop an “initial infrastructure” to promote continent-wide adoption of networked PC architecture. Such an infrastructure would provide a basis for African people to exchange information with others for their mutual benefit, and it would allow the implementation of knowledge dissemination for wide benefits to their people.

The project is designed with several assumptions: that there is a strong desire to get “connected” with many other peoples of the world and their nations; and that potentially there are great benefits from better access to more useful information. However, today there is little or no communications infrastructure, as well as little or no electrical supply infrastructure.

This project will require significant financial stamina to maintain and achieve success. The payback to the “lender” is access over time to a richer and more robust financial marketplace. The project should be considered as a 10-to-20-year effort. To assure logistical efficiency, several African factories and logistical infrastructures should be established. The project needs service support of a scale not currently available, and it needs to train several million people per year.

The project requires that a Pan-African wireless network be established, because a traditional network infrastructure will take too long and be too fragile. Because of a lack of reliable electrical supply lines, two power-supply options are considered: (1) entry level “Clockwork” powered as per “wind up” radio

or (2) mobile phones powered by energy from walking. Additionally, associated infrastructure must be established for the support of service providers, trainers, and server access and, where applicable, applications services, such as "corporate" systems.

Implementation would start in schools and libraries, improving access to information for youths and education, through a multi-faceted approach. For example, choose a small pilot of 100,000 seats and build a robust solution. Allow few changes and use best-practice solutions from large developed networks. Develop stakeholders for each country—perhaps different countries could choose different aspects of implementation to support.

Africa needs this solution but only in a way that suits the African people. A total cost of approximately \$500 to \$1,000 dollars per connected PC needs to be found, as well as a long-term approach to finance—perhaps some form of tie-in to each country's improvement in GNP. Alternatively, provide a service and then have gradual approaches to service charges until break-even is achieved. Hardware needs to have a long shelf life and some form of security is needed to protect information privacy.

Benefits to the lenders include the creation of a large and diverse community and the potential to be involved in the creation of a long-term wealth-creation program. The program would provide a well locked-in community of users: it should be attractive to global IT suppliers.

What is required for the project to be successful? Global Information Technology suppliers must "lend" know-how and material assistance. Developed countries must provide starting capital. Requisite financing could be

achieved by collectively pooling assistance from wealthier countries. The program, if implemented, would result in a new pool of labor for the global IT economy, contributing greatly to African development.

Discussion Highlights

Project Africa

One participant noted that the Rascom³ experience showed that the best way to slow such a project is to have government involvement. Thus, in order for such a bold project to succeed, there needs to be an aggressive initiative driven by private sector interests. Moreover, a clear financial incentive, or profit motive, is also necessary for such a project to ultimately succeed.

Improving African Technology

The issue of the availability of upgraded computer technology, or lack thereof, for African countries, was raised. How much can be done with existing computers and the available software? Could there be a way to recycle technology rather than having "outdated" models dumped into landfills? What circumstances belie Africans to be the recipients of outmoded technology? It was posited that hardware availability is never the problem, but rather the challenge is developing the human capacity necessary to obtain it and use it effectively.

³ The African Regional Satellite Communications Organizations, located in Abidjan, Côte d'Ivoire.

Panel III: Economic, Social and Political Impact of Information Technology

This panel's primary objective was to address the interplay of IT with the economic, social, and political forces controlling development in Africa over the next few years. For the purposes of this workshop the terms "Information Technology" (IT) and "Information and Communication Technologies" (ICTs) were used interchangeably. The subject of discussion was drawn sufficiently broadly to include telecommunications, computers and software, the Internet, and TV and radio broadcasting. The discussion also explored the role of human resources in installing and operating IT, as well as in setting and enforcing IT policy.

The global spread of the information revolution has moved slowly in Africa. Numerous obstacles are restricting the full economic, social, cultural, and political flourishing of Africa. The continent is facing social crises—mainly caused by wars—but also due in part to poverty, diseases (particularly HIV/AIDS and dysentery), malnutrition, population shifts, and illiteracy. The difficulties of handling these phenomena, coupled with over-indebtedness, have limited the ability of African nations to take charge of their own development.

African Internet: A Status Report

African nations have very high unmet demands for information and communications, indeed, among the world's highest. The region has shown trends over the past decade toward both democracy and market-oriented economic policies. There is a large potential impact in the future from IT, but that potential is largely unrealized.

The IT infrastructure is expanding rapidly in Africa. Five years ago, only a handful of countries had GSM cellular operators and local Internet access. There are now over 600 ISPs operating, including ISPs in all African countries. There are almost 100 mobile providers and more subscribers to mobile lines than fixed lines in Africa. Some countries are now moving toward full competition in fixed telecom networks.

The infrastructure differs greatly among regions in Africa (see Table on page 20). New infrastructure and technologies are increasingly being adopted in Africa, including:

- Cellular and mobile phones.
- Wireless (including local loop and data services).
- GMPCS⁴ (Globalstar).
- GEO satellites (Intelsat, Panamsat, Lockheed-Martin, Eutelsat, NewSkies, Europestar, Anatolia, Nilesat, Arabsat).
- Fiber-optics (both national networks and regional networks, such as WASC/SAFE and Antantis-2).
- LEO data satellites (e.g., HealthNet, VITASat).
- Data broadcasting (i.e., WorldSpace and DSTV).
- Voice over the Internet (VOIP).
- Low cost Internet appliances such as set-top boxes.

⁴ Global Mobile Personal Communications via Satellite.

Regional Technology Infrastructure

Region	Dialup Internet Subscribers	International Outgoing Bandwidth Kbps	Number of ISPs	Population (millions)	Dialup Subscribers Per Million People
Central	10,100	3,072	17	71.48	141
East	120,600	24,894	80	216.42	557
North	279,000	294,096	360	139.25	2,004
South*	80,350	33,044	35	69.42	1,157
South Africa	750,000	350,000	80	44.31	16,926
West	122,725	68,072	77	228.78	536
Africa	1,362,775	773,178	649	769.66	1,771

*Exclusive of South Africa

Source: Mike Jensen "The African Internet: A Status Report"

Because of the high cost of local calls, e-mail is by far the most popular application of the Internet; its biggest effect has been to reduce the cost of international communications. Through use of the Internet, businesses, individuals, the media, non-governmental organizations (NGOs) and governments have been able to reduce their isolation, improve decisionmaking, obtain additional resources, and generally achieve better communications with disparate family members, friends, colleagues and partners.

Economic Impact

The IT infrastructure for business is improving. Telecommunication services are increasingly available, and now include both basic and advanced services such as video conferencing and live data streaming. Supply of telecommunication equipment is improving, especially mobile and fixed wireless, as is computer equipment supply for both consumers and businesses. Corporate Internet access is available, as are leased lines and very small aperture terminal (VSAT) connections. Business centers and hosting services (e.g., UUNET Africa, BusyInternet Ghana) are serving business customers. Consumer telephone and Internet access services (e.g., AfricaOnline's E-Touch, Sonatel's telecenters) are improving, and

extending service into less affluent populations and more rural populations.

As a result of the improving infrastructure, Africa is beginning to see changes in business operations, e-commerce, and IT-based goods and services. For example, African craft-makers are selling their wares via the web through an NGO called PeopLink. Similarly, a West African women's fishing cooperative has created a website for its 7,000 members to promote their produce, monitor export markets, and negotiate prices with buyers overseas. In Ethiopia, Ethiolink is selling goats over the Internet; Ethiopians of the Diaspora can buy a goat on the web to be delivered anywhere in the country, and are doing so to supply animals for family celebrations. IT is improving banking and other financial services in countries such as Morocco and Zimbabwe.

Opportunities are being created for African enterprises to market teleservices, such as data entry, to developed nations. The low cost of labor in Africa allows firms to compete in transcribing paper archives, bookkeeping, as well as medical, financial, and insurance records transcriptions—for example, a Moroccan ISP is currently digitizing France's national archives.



Rural telecenter in South Africa

Source: Courtesy of Mike Jensen.

International call centers in Togo and Mauritius are providing competitive telephone support services for foreign companies. One of the most unusual examples occurs in Cape Verde, where security guards monitor surveillance cameras located in Boston, calling for on-the-ground support in Boston if intruders are detected.

Social Impact

There is considerable interest in distance education and training in Africa. The African Virtual University already has fee-paying students on 24 university campuses in Africa linked to teachers and libraries worldwide via the Internet. Cisco Network Academies are establishing IP network training in less developed countries (LDCs), and even in Kinshasa, in spite of the difficulties of working in the Congo. The African Digital Library has been established, making copyrighted material available at subsidized rates for Africans. School-based telecenters are being created in Uganda. Similarly, applications are being developed in health services. Thus, x-rays are being e-mailed in

Mozambique, making expert medical evaluation available to patients without requiring travel to the specialist. Results of blood tests are being transmitted via text on mobile phones in South Africa.

Effects are also being felt on governance and public participation in the political arena. For example, the Government of Lesotho recently declared that all announcements for cabinet and committee meetings would be made only by e-mail. Some administrations (including those in South Africa, Algeria, and Tunisia) now provide immediate global access to vendors via the web. In Senegal, technology is being applied to local government decisionmaking and planning. Mobile text messaging is being applied for crime reporting in South Africa, and has “been planned for application in farm violence reporting in Zimbabwe.”

Internet in Africa



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Côte d'Ivoire and the New Information Age

In Côte d'Ivoire, full access to the Internet has not yet been achieved. In fact, many regions within the country remain without any electronic connectivity at all; the average teledensity (number of main lines per 100 inhabitants) was only 2.5 compared to 45 in Europe, an indication of the low level of socio-economic development of the country. The information age can facilitate growth and fuel development in Côte d'Ivoire.

Social Impact

Education. Information technology can help reduce the education gap and facilitate access to other services, such as healthcare. The illiteracy rate in Côte d'Ivoire is high, especially among women; there are few schools and universities. The explosion today in the number of Ivorian students seeking admission to higher education surpasses by far the capacity available, resulting in large numbers of students per class. The very few libraries have very limited access to international journals and have very small and old collections of books and monographs. They do not have budgets to buy new books.

To respond to the challenges and crises facing education in Côte d'Ivoire, the new information and communication technologies facilitate learning environments that are more meaningful and responsive to the specific needs of students and teachers. The Internet creates opportunities to provide equitable remote access to resources and to international distance education facilities; it is connecting schools, universities, and research centers to national and international distance education facilities. IT can extend the reach of educational facilities in informal learning into the community level. Today, students can study and research using computers, video, television, film, multimedia, and

networks. Libraries, in theory, can now be without borders, accessed globally. However, the task at hand is to find the political will and the money to make that a reality.

The World Bank, through its Global Development Learning Network (GDLN), has integrated Côte d'Ivoire in its network of institutions of West Africa. Abidjan is connected through the "Centre d'Education à Distance," located on the campus of the Public Administration School. Through the World Bank's project, video teleconferences, seminars, and certification courses offer executives, students, teachers, or researchers the opportunity to share knowledge, to learn, and exchange experiences.

Health. The impact of telemedicine in Côte d'Ivoire is very low. However, one of IT's most visible benefits is seen in the ability of health researchers and professionals to access up-to-date research and reference material. In cities such as Abidjan, Bouake, or Daloa, the Internet has afforded health workers rapid information exchange, conferencing, distance learning, and access to urgent advice or diagnosis assistance. As a result, many physicians have improved their diagnoses through global networks. With the Internet, networking allows the dissemination of best practices for fighting against HIV/AIDS—such as "risk mapping."

Economic Impact

In the past, there was a need for clerical assistance to create documents; there was an average of one secretary for every two professionals. Now, the number of secretaries is decreasing, because most of the professionals type their letters and papers themselves and attach files directly to their electronic mail. Former secretaries are trained to be administrative assistants with new computer-based skills.

The new information and communication technologies have created new types of jobs. Internet sites, cyber-café, telecenters and business centers have grown fast, offering services from the provision of e-mail addresses for Internet access to the hosting of web pages or websites to the design of web pages and websites. Each telecenter or cyber-café employs a minimum of three employees; equipment tends to include two or more of the following technologies: cellphones, faxes, computers, Internet connections, photocopiers, and scanners. Such facilities are unfortunately faced with the high prices of the telecommunication lines imposed by Côte d'Ivoire Telecom, the only company selling national and international telephone lines. The fixed telephone has failed to efficiently serve urban and rural areas.

The mobile phone arrival has been like a “communication miracle” in the remote areas. It also has widened telephone access to all social classes. Communication within the country and outside the country is now relatively easy; the problem is the cost, but with the benefits of competition (more than one mobile phone company), the user will get a lot for his or her money. There are three mobile phone companies: IVOIRIS, TELECEL and COMSTAR; in December 2000, these together had 322,500 clients.

Since the Leland Internet node was opened in 1996, the number of ISPs has increased. Today, there are four ISPs in Côte d'Ivoire: AFRICAONLINE, AFNET, COMAFRIQUE and AVISO. Very few ISPs are settled in the countryside—AFRICAONLINE in Bouake and Daloa, and AVISO in Bouake and San-Pêdro. However, many of the potential users in the regions are not benefiting.

Telephone Statistics for Côte d'Ivoire

Year	Fixed Phone Lines	Mobile Phones	Population	Ratio of Adoption
1997	142,322	36,005	15,292,000	1.17 %
1998	171,001	91,212	15,854,000	1.65 %
1999	219,283	257,134	16,377,182	2.91 %
2000	240,000	322,500	16,377,182	3.32 %

Community Development Experience

While conducting work in poor, rural areas of Côte d'Ivoire, community organizations have obtained important information and documents from the Internet that helped in developing appropriate methods and techniques for service delivery to the poor—mainly women farmers.

One project, done in cooperation with a private ISP company, was an effort to link farmers' cooperatives to the “planetary village” through the establishment of telecenters in rural areas. The pilot project was done with the Cooperative of Alepe, a farming village roughly one hundred miles

Internet Connectivity in Côte d'Ivoire

To **USA**: Leland Node (established in 1996) at 256 Kbps via MCI

To **France**: one connection at 1,000 Kbps via France Telecom

To **Canada**: one connection at 256 Kbps via Teleglobe

from Abidjan. The cooperative bought some equipment (computers and a printer), and the project provided more (fax, server, photocopier, scanner) and an Internet connection—and a telecenter was established. Literate members of the cooperative were trained in the use of the new technologies, with emphasis on how to access information from the web, particularly the world's market

prices of coffee and cocoa. The people served by the project were able to exchange mail internationally as well as locally. Later on, the cooperative decided to earn money from the center and opened it to the public, applying a sliding scale of fees that enable the disenfranchised—mainly women’s associations—to benefit from the services. The Telecenter of Alepe has saved the local population many trips to the cities and allowed them to enjoy easy, and relatively inexpensive, national and international communication.

Today, demand for the services of the cooperative’s telecenter has increased to the point that it has been able to attract a mobile phone company to extend its network in Alepe: the telecenter sells the company’s cellular phones and retains a commission. Peace Corps volunteers who were trained in that village were happy to find the telecenter and used it frequently in their leisure time for e-mail and surfing on the net. Thus, the introduction of the telecenter has fostered development in this remote area by shortening the distances to the outside world.

Another example of a successful initiative involved the diffusion of cocoa and coffee prices to farmers. The agricultural extension agency (ANADER), based in Abidjan, e-mails world coffee and cocoa market prices to its extension agents (ANADER’s intranet system covers the entire country). The agents then relay the information to farmers. The farmers and farmers’ cooperatives are then able to get better prices for their products.

Another successful example involves opportunities to apply for grants on the web. One of the members of a network devoted to women in agriculture found a call for proposals on the net, developed a proposal for an agriculture project to benefit a group of women farmers in the north of the Côte

d’Ivoire, and submitted it via the Internet. Her proposal was successful, and she got the funding to finance her project—which is presently helping about 100 young farmers to raise bees to produce honey, thereby earning money. The income generated by this project has made a difference in their lives.

Political Impact

In Côte d’Ivoire, the impact of the new information and communication technology on the media has been phenomenal; IT presents interesting opportunities as well as challenges to the media. Through electronic versions of newspapers, a form of democracy has emerged. Ivoirians of the Diaspora can follow events in the country through Internet versions of local newspapers, and they can contribute to political debate via the Internet. Local radio can be heard on the Internet, and some newspapers are on-line and can be consulted and read from all over the world. This international availability of information has brought more transparency in the election process.

National leaders now have websites where all information on their activities and plans are posted, facilitating greater interaction with the populace, via e-mails. Political parties, too, use websites for campaigns; they reach more people than with individual visits.

The example provided by the recent, controversial election in Côte d’Ivoire is worth sharing. The parties created a website for the campaign and provided cellphones to their representatives. Fax machines were set up to record the votes from all the regions, and the representatives of the different parties had cellphones. As soon as the counts of the votes were made, the representatives of the different parties signed the official report. Copies of the signed, validated reports were given to the representatives with the

indication of the number of votes for each candidate.

Immediately, the representatives communicated the results to their headquarters. When the fax was not available, the cellphone or regular phone was used to communicate the information to the headquarters in Abidjan, which, in turn, put the information on-line (the websites were regularly updated by an IT specialist). Close monitoring of the election on-line prevented a fraudulent election victory; transparency was made possible by using the new information and communication technologies. This is a new phenomenon in Côte d'Ivoire.

The weaknesses of IT in Côte d'Ivoire include the high cost of computer equipment; weak maintenance of hardware and software; low reliability of telephone lines; lack of widespread, low-cost access to the Internet; lack of human capacity to utilize the technology; and lack of low-cost telephone lines.

The South African Experience: A Regulator's Viewpoint

In South Africa, a country in transition, the regulator's job was thankless but necessary. In spite of some very difficult hurdles along the way, the South African Telecommunications Regulatory Authority (SATRA) discharged its responsibilities beyond expectations. The growth in information technology in South Africa since 1997 (when SATRA came into existence) is now known and admired worldwide, and the regulatory regime of progressive interconnection guidelines is known equally well. Indeed, dial tone teledensity grew from four to eleven percent during that period. Much more could have been accomplished, had it not been for some serious high-level challenges faced by SATRA.

Discussion of this subject is timely. Information technology is changing even more rapidly, and Africa's IT development is now at a critical juncture. Africa can move forward and benefit greatly, or regress as the rest of the world moves forward. Information technology has profound economic, social, and political implications on the future of Africa. The potential impact of the attitudes and behavior of the very African leaders who should be carrying the torch for the adoption of information technology is crucial.

One point that remains very clear is that the overriding impact of information technology is to nurture democracy. Democracy relies almost exclusively on the free exchange of information within a population; in countries ruled by undemocratic leadership there is a clear fear of information technology, resulting in strong attempts to 'regulate' technologies like the Internet.

The Social Impact

Education is the cornerstone of any country's development. Information technology relies on the availability of the simple dial tone. In a country such as South Africa one finds that the legacy of poor education infrastructure can be significantly corrected with tele-education. Indeed, in the urban areas of South Africa, students have access to television programs on math, physics, and chemistry. In rural South Africa, however, one has to have a satellite dish to access the same programs. This suggests a larger trend: broadly, rural Africans do not have access to the same information technology benefits that urban Africans have—and Africa is generally a rural continent.

It is not a surprise that one sees a relatively strong correlation between low teledensity, for example, with a lack of social development.

The Economic Impact

There is very little doubt that information technology has a positive development on the economy of African countries. South Africa's economy has grown over the years, even during the difficult days factories operated with telephone service, electricity, and water. And, certainly, throughout the country's recent history, communications empowerment for the productive sector—the ability to send first a telex, and then a fax, and today an e-mail—has helped economic growth.

Today in South Africa, industry complains most about the lack of bandwidth, affordable or not, for a modern information technology network. Here the challenge that ISPs face is that the government, as the major (and only) player in the industry, greatly fears competition from the private sector. Foreign investors find themselves having to become minority partners with the government in order to play any type of role.

One of the success stories in South Africa is the community telephone kiosk. In rural and semi-urban areas these take the form of containers one ordinarily sees on ocean-going cargo ships. For wireless service, they have a cellular antenna and cellular pay telephones inside.

The Political Implications

There is a strong correlation between low teledensity and low development of democratic institutions. Higher teledensity should, and does, come first. An informed populace cannot stand poor governance. The leadership in some African countries, afraid of democracy and its attendant short terms in office for elected officials, often goes to great lengths to regulate the growth of information technology. Often the excuse given is that the country does not have the resources to develop the information technology infrastructure.

What the leadership in these countries really means, of course, is that it does not wish to see the information technology infrastructure developed. The reluctance to see the growth of the IT infrastructure among some African leaders is based upon a fear of its political impact. Leaders worry that informed citizens would have higher expectations of their governments.

The WTO Imperative

The WTO holds the potential to make a huge positive difference in the development of information technology on the African continent. However, that potential was undermined when the small investment required for setting up independent regulators was not factored into the WTO mechanisms. Sanctions for non-compliance are well provided for, but not technical assistance for success.

Under the WTO Agreement of Telecommunications Services, signatory countries on the African continent stand a better chance of attracting foreign investment for their business people with information technology service licenses. This is true provided the African countries take certain policy initiatives. What has generally been problematic for the countries has been the lack of resources to carry out the initiatives they have agreed to take: this is particularly true in setting up independent regulators. It is also true, however, that in some countries the ostensibly independent regulators are set up with no intention that they carry out their nominal functions, particularly where the government owns the players in the telecommunications industry.

Examples of both success and lack of success are to be found in Southern Africa. Lesotho is an excellent example of success: the government sold most (70 percent) of the national telephone company, and today

Lesotho shows vivid signs of clearly having an independent regulator. In South Africa, by contrast, the Minister of Communications, as the head of several players in a regulated industry, was alarmed that she was subject to regulation by the independent regulator. The result has been messy, with industry not trusting government policy promulgated by the minister because the minister is perceived to be setting policy to protect her own interests in the industry. This type of behavior makes it difficult for potential investors to believe that government policy is to be taken seriously or that a minister will act responsibly when making decisions.

Discussion Highlights

Potential Pitfalls

One presenter noted that this workshop was based on the premises that technology can be used as an agent for change and that technology can promote economic growth. However, to take advantage of the technology requires equipment, access, and the knowledge of how to create the content and how to access existing content. Such knowledge has been limited and should include local content.

Equipment is expensive; the access to the Internet is also expensive (telephone lines and ISPs). It is important that governments reduce relevant tariffs. Moreover, culture can be a key impediment; there is a lack of openness and transparency with governments often operating in an atmosphere of mistrust and corruption. African policymakers must allow everyone to have access to information.

Possibilities

It was emphasized that radio must be a major focus in communications development. A presenter suggested that the Internet, used in tandem with radio, could disseminate information to aid in conflict prevention. A

participant noted that one of the most important communications technologies in Africa, World Space, utilizes satellite technology for radio programming, a very powerful tool that can reach the rural poor.

Although the predominant mode of communication remains radio and television, some political parties, particularly in Côte d'Ivoire, are trying to use websites. However, the general population does not have access to the Internet and therefore its political impact remains limited. As such, it was suggested that programs should continue to be developed, such as the Leland Initiative, which help increase Internet access, make telecom companies more available to the general public, and promote local capacity building in Africa.

Panel IV: Regional Breakout Sessions and Group Presentations

The fundamental question addressed in the regional breakout sessions was: what is the role of IT in conflict, political change, and economic development? In discussing this broad question, conference participants were asked to focus on identifying the e-readiness of the countries within the various regions—West, Central, East, and Southern. Moreover, how do the four factors—Culture, Competence, Capital, and Control—influence who uses IT and for what purpose in the economic, social, and political systems within African nations? Also, what will be the economic, social, and political implications of the different patterns of IT that will be expected to emerge across the continent?

With respect to the four regions, all participants were asked to specifically consider the following:

- *How do cultural issues act as drivers for or impediments to: conflict, political change, and economic development?*
- *What is the educational capacity and the institutional competence?*
- *What is the financial and banking environment of your region?*
- *How is Information Technology controlled—by the government, private sector, or nonstate actors?*

As participants discovered, the differences in Internet connectivity and technology illustrated the complexity, and challenge, of IT diffusion in Africa.

Southern Africa: Focus on South Africa

The overall discussion concentrated on the role of language and culture, issues of state control over IT, and the IT-economic development and IT-education nexuses. Commentary on conflict and political change was brief, but a number of important points were made. Nationalism and ethnic politics were essentially absent from the discussion.

South Africa is considerably more affluent than other Sub-Saharan countries and has a more extensive IT infrastructure. As a result of South Africa's long isolationist and active "defense" posture, the nation had developed indigenously a good base of intellectual property. Can these properties now be harnessed with IT to the advantage of South Africa? While no direct reply was made regarding South Africa's ability to muster its intellectual properties with IT, it was noted that the owners of these properties are representative of the former elite, a small subset of the total population, and that the participation of others is still needed. Although labor costs are low in South Africa, most agreed that other economic variables, such as sophistication of the work force as well as the "bottom line," ultimately were more important than the cost of labor. One participant commented that the bottom line was that for anyone interested in doing business in Africa, South Africa is at the top of the list, no matter what risks might be present.

Discussants disagreed regarding whether the preponderance of English on the worldwide web constituted a "language gap." Some argued that the use of English was a unifying force in South Africa—a country with 11 official languages. English is *lingua franca* of five Internet radio stations, two broadcast

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multi-lingual programs, and it is not uncommon for multiple language utterances to be used in the same broadcast sequence. Others noted that while language may be a centripetal force, language has also been divisive or a centrifugal force, and that some tragic events were directly related to the issue of language. A discussant asked if Southern Africa as a region has an advantage beyond its proximity to South Africa due to English as *lingua franca*. Another referenced the language policies in the UK as examples of how governments can legislate dual-web language.

The group then turned to a discussion of why South Africa has been such fertile ground for modern IT growth. What enabled South Africa to move as fast as it did? Was IT a driver and catalyst for the other changes in South Africa?

Some of the most important conditions behind the rapid growth of IT in South Africa are: a well-developed infrastructure, greater political stability, and a good education system—the ground was fertile for modern IT diffusion.

Some discussants agreed, but noted that, while these facilitating structural features might be *necessary conditions*, they are not *sufficient conditions*. Other African states, notably Uganda and Sierra Leone, also enjoyed similar features but have not been as fertile for IT diffusion. It was suggested that in addition to these structural foundations, it was important that contracts were honored. South Africa was then compared to the Nigeria of the 1970s. However, it was noted that Nigeria has not experienced a similar diffusion of IT.

With respect to the educational structure as an agent for IT diffusion, no one disputed that the South African educational system is

relatively better than that of neighboring states.

One participant noted that, while the South African educational system is “better,” South African students tend to focus on social science and arts, and not engineering or other technical fields, however, this emphasis has changed. Does this imbalance have important implications for the capacity of South African educational systems to foster IT diffusion? Another participant responded that while earlier generations did tend to favor non-technical education and training, the new generation did not. Thus participants raised the need to distinguish between the impacts of *technical education* and *basic education* as agents for aggregate diffusion.

Another participant noted that under apartheid South Africa had to have a good IT structure (Telecom) for state security, and that when “new” government officials came to power they saw the Telecom as the “shining light” and recognized the need to protect this status. This person noted that the decision to protect the IT sector also acted to stifle the additional development that can only occur in a competitive environment.

Discussion on this topic concluded with the hypothesis that the value of a free press and free expression, which was even appreciated by some under apartheid, spills over to facilitate greater acceptance for IT diffusion, and that the South African tradition of an independent judiciary further boosted the diffusion of IT.

Discussants then considered the role of IT in reducing long-term development risks, such as crime, brain drain, and AIDS, that may if left unchecked lead to a downward development path for South Africa. IT can be applied to increase the efficiency of police officers and public health officials, as well as

to create job opportunities in South Africa for those who might otherwise emigrate.

This revealed potentially counteracting impacts. One participant noted that with increased IT use financial assets are expatriated more quickly. This suggested elements of both instability as well as safety for investors as a result of the ability of IT-facilitated movement of assets. Another person concurred with the simultaneous elements of both stability and instability of IT. He noted that the work force could benefit from better organization, while at the same time management could streamline extraction and profit generating processes.

One person noted that townships are among the highest risk for child abuse and that townships are among the least served IT areas. What, she asked, is the role of IT for this situation? One person replied that townships and rural areas, both under-served, have important differences, and that the most important is that townships can be more easily connected as a result of the close proximity to already connected areas.

The group then turned to a long discussion about the issue of control, which can be reduced to two themes. First, how does South Africa directly control IT use and diffusion? Second, how does this direct control impact South Africa's ability make decisions, which determine future options for itself as well as for other countries?

An example of the consequences of the direct control exercised by the South African government was offered: Cisco dominance of router sales alongside the propensity of the State Information Technology Association (SITA) to order Cisco routers. It was, moreover, suggested that this dominance is the result of non-rational cost benefit analyses by SITA. It was also noted that SITA has

inadequately trained personnel to oversee and assess IT projects, a condition that is magnified by the short tenures of SITA Managing Directors (five to seven in the recent past); consequently, non-qualified implementers are placed in the critical implementation role for Ministry of Public Administration decisions.

The outsourcing of all IT needs by many banks to the Telecom, a governmental entity, was another example cited of increasing South African state control over the IT sector. This reinforced the point that the government controls or manages all important aspects of IT in South Africa, and that control, ownership, and capital are tied up in the same entity. On the issue of concentrating influence in the government *qua* monopoly, one participant noted that there were economic monopolies like the former AT&T, and that governmental-regulated economic monopolies are very different from monopolies that integrate both economic and political power.

Group discussion then turned to legislation under consideration that may result in the inoperability of ISPs under their current licensing agreements and requirement that banks secure new licenses to operate their ATMs. This demonstrates that control of IT is increasingly being centralized under the Minister of Communications. In essence, no matter what the law might say, the state "monopoly" determines the outcome.

It was noted that among information technologies, the Internet is the primary target for government "control." The desire to control the Internet is prevalent despite the fact that it is among the more difficult ITs to dominate. In particular, the inability to control the Internet could increase the propensity to use force as a control mechanism. A number of participants

thought that the press could be used to mitigate this potential scenario.

A number of questions were raised reflecting concerns about the ability to resist control:

- Will technology find a way around government systems despite their best efforts to impede diffusion?
- Will governments be a significant obstacle to IT diffusion?
- Will governments be realistic and see the private sector as an ally?

Participants agreed that with the right incentives people will find a way around impediments regardless of the sanction, and that politics, not technology, will be the answer to many of these questions. One observer noted that many non-IT issues and policies are raised in discussion about IT—IT is the carrot; IT is what is needed for countries to improve both economically and socially. In this dialogue IT diffusion is seen as the head domino: do IT right and the rest will fall in place; get IT right and the rest will be right.

An example of path-dependent control was given in the South Africa regulation experience. Since South Africa was the first to regulate—or at least a leader in IT regulation—other African states look to the South Africa regulation experience for guidance in their own regulatory processes. Thus, the South African experience and myriad IT decisions made by South Africa will form much of the lessons-learned platform other African states will use to filter their own decisionmaking process.

Discussion then turned to the role of South Africa for other African states, and in particular the South African Development

Community (SADC) states. Some thought that the South African experience could potentially be a good model for SADC. However, some participants questioned whether the South Africa plan would diffuse through the region. One person noted that the bifurcation of organization, with management in the international sphere and the rest of organizational structures in the domestic arena, would limit the domestic influence on the international business. Another cautioned that the successes and failures of the South African model and experience will have implications for other African states, and that some of the implications will be “false lessons.”

The question about the regional circulation of knowledge was raised, as well as the diffusion agent: the .edus or the .orgs? The group identified strong institutions and leadership as important.

The Millennium African Recovery Program (MAP) was discussed⁵ as an example of regional initiatives, and the African origin of the plan was seen as a distinct strength of this effort. However, it was noted that South Africa did not consult other African states and that, as a result of the perceived arrogance, South Africa was resented to some degree.

With respect to AIDS, leadership was raised as an important issue. One participant noted that South African President Mbeki himself surfs the Internet, and appears to have gotten “bad” information about AIDS from it, and appears to have set national AIDS policy based on this “bad” information. A number of participants noted this as an example of the importance of leadership in determining uses of the Internet and the Information Revolution as a whole. South Africa’s work force is

⁵ MAP was also called the New African Initiative, but has been renamed the New Partnership for African Development, NEPAD.

comparatively well educated but still vulnerable to AIDS because the available information on how to control AIDS has yet to be fully effective in changing risky behavior.

Two other potential sources of political and economic instability were discussed. First, it was proposed that traditional sources of information normally controlled by the state have been eroded as a result of increased Internet connectivity. Second, increased IT diffusion was deemed likely to increase immigration and the influence of the Diaspora. These two trends may pose a complex dynamic between an outflow of human resources and an inflow of knowledge and capital, which together can result in both economic and political benefits and vulnerabilities.

Central Africa: Focus on Democratic Republic of the Congo

The political and economic instabilities in this sub-region constitute key constraints for development of IT. The Democratic Republic of the Congo (DROC) is at war with the surrounding countries of Burundi, Rwanda, and Uganda, and the latter two, through their proxies, are occupying almost half of DROC. Troops from Zimbabwe and Angola are also stationed within the government-controlled areas of DROC.

In addition to regional conflict, DROC's neighbors have been or are still fighting their own civil wars. The Government of Angola has been at war with the UNITA rebels for 25 years. Sudan, which borders DROC to the northeast, has been mired in civil war for 18 years. Militias in the Republic of the Congo (Brazzaville) are still not completely disarmed from civil war in that country, and Chad, which fought a 10-year bloody civil war in the 1970s and 80s, has struggled with

insurgency for the past fifteen years. The government in the Central African Republic recently repelled a coup d'état.

Chronic conflict explains, in part, why the Central African Economic Community may be the least functional of the sub-regional economic communities, and in last place in terms of the number of radios/televisions, telecom facilities, and cellular telephones per capita. However, DROC also belongs to Southern African Development Community, and its main foreign exchange earners—minerals—are exported via the “southern highway,” whose terminus is the port of Durban. In addition, the transportation infrastructure of eastern DROC is more linked to eastern Africa than to Kinshasa. The sub-region lacks a geographic cohesion that other sub-regions enjoy.

Finally, the group noted that DROC has been plagued by the lack of good governance traditions, and that it suffers from crumbling infrastructure. However, DROC is resource rich and has a potentially unlimited supply of electric power that can be exported all over the sub-region and beyond. Its poor communications infrastructure offers an opportunity to leapfrog previous generations of technology, as witnessed by the widespread utilization of cellular telephones. Further, if gain is to be made from adversity, then opportunities for progress ought to be seized during the reconstruction phase.

Central Africa: Focus on Democratic Republic of the Congo



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Factors Facilitating or Impeding Change

In keeping with the recommendations for the workshop, participants in the breakout session discussed these factors under the “4 C” headings:

Control

- Central state control exists, but because of the weak state, IT is without a high degree of regulation.
- Cross-country cellular telephone and Internet services are limited by foreign military occupation of approximately half the country—the east and northeast; Goma and Bukavu in the Kivu provinces are linked to Rwandan telecom services.
- Absence of overbearing regulation and the current Inter-Congolese Dialog process offer opportunities for developing a favorable policy framework.

Culture

- **Language.** Some 200-250 dialects are spoken, with Swahili, Lingala, Tshiluba, and Kikongo as officially recognized national languages. French is the official unifying language in the DROC, but English is making inroads. Based on his schooling in Uganda, President Joseph Kabila speaks English, as do leaders Museveni of Uganda and Kagame of Rwanda—countries that occupy the East. IT technicians in Kisangani, and presumably elsewhere, are bi-lingual in French and English. Many young Congolese have studied English, and those who attended the better schools are literate in English. It will be interesting to see whether France—perhaps via the bias of *la Francophonie*—possibly in concert

with Belgium, attempts to counter growing Anglophone linguistic and cultural influence in IT in DROC, Rwanda, and Burundi.

- **Nationalism.** DROC is not resistant to the outside influence of IT, and indeed embraces it. The national territory is divided de facto by occupying forces, which impacts private sector development of IT. Internet expansion in the east could have potentially destabilizing effects, and, because of violent polemics, IT in the hands of extremists could be used for further disruption. One Mobutu legacy is a strong national identity within DROC even though irredentist behavior from the east threatens national territorial integrity.
- **Stratification.** A thin layer of elites uses IT in DROC; illiteracy is as high as 70 percent, which is a limiting factor to the widespread use of the Internet.
- **Legal Framework.** The justice sector is extremely dysfunctional, and justice generally is for sale to the highest bidder. High court judges officially are paid about \$50 month. If DROC has a viable legal framework for intellectual property rights, it is not enforceable under the present circumstances.
- **Trust.** There is a tendency to hoard information because of the difficulty of establishing trust beyond ethnic or cultural-linguistic groups.

Competence

- **Sophistication of IT use.** DROC is not a producer of IT goods and services, but it is a producer of a vital raw material, which is exported as coltan—utilized in

manufacturing cellphones.⁶ Coltan mining has fueled the conflict in the east.

- **Education and training.** The level of education and training in DROC in IT is low and generally not based on merit and competence.

Capital

- **Internal financial capital.** The group lacked information on this, but according to a USAID study conducted in June 2001, the private sector is ready to develop some IT such as Internet connectivity.
- **External financial capital.** The breakout group described problematic rule of law, poor governance, corruption, formerly very volatile exchange rates, the state of war, political uncertainty, and a moribund business climate overall, as factors making DROC (and some other countries in the region) a high-risk investment environment.
- **Currency.** Because of the volatility of the Congolese Franc (at least up to June 2001), the US dollar is the main currency in use, especially in the east. Congo/Brazzaville, Central African Republic, Gabon, and Cameroon use the CFA franc.
- **Physical capital.** DROC has an abundant and cheap supply of electric current from Inga Dam although access to that electricity is limited to a few large cities.

⁶ Columbite tantalite, coltan for short, is a mineral from which metallic tantalum is refined; tantalum is an important material used in the manufacture of capacitors, which are used in electronic equipment.

IT Utilization: What the Next 10 to 20 Years May Hold

Governance Applications

- Increased use of PCs and other IT is possible as part of an effort to combat corruption by increasing transparency in government transactions, such as Customs, Ministry of Finance, Procurement, and Treasury disbursements. Resistance from rent-seeking civil servants is expected to impede the widespread acceptance of IT in this sector.
- Increased use of electronic media—especially short wave, FM and possibly digital radio—could facilitate communication and civic education, bring the hinterlands out of isolation, and provide neutral and objective news and information. Internet service will be used to connect civil society and public sector institutions with each other—both inside a given country and outside, to the sub-region and beyond.
- Media have also been used for propaganda and to encourage genocide, such as occurred in Rwanda in 1994, when extremists gained control of the radio.

Business Applications

- IT could be useful in electronic bank transfers from regional banks to the Central Bank and between regional banks and private accounts.
- If political conditions are stable, IT should be beneficial for tourism.
- More efficient and speedier business links with the developed countries and around the world should lower the costs of doing business in Central Africa.

- Unfortunately, IT in Central Africa may encourage scams such as those coming out of Nigeria.

the gap—and may quite possibly surpass West Africa in the use of cellular phones and radio.

Social Welfare Applications

- Given the loss of teachers to AIDS, IT could provide means for distance learning; IT could be critical to filling gaps in education and training.
- IT will likely be used for distance medical diagnoses and treatment, as it is presently being used in South Africa.
- Information technologies elsewhere are vital to famine early warning systems, food security, humanitarian assistance, and monitoring epidemics; they may have wider application to conflict prevention in the sub-region.

East Africa: Focus on Uganda

The group in the breakout session decided that it was important to broaden its focus to look past the impact of information and communication technologies upon the economic development of East Africa. Discussion was broadened to examine the effect of IT upon the human development and quality of life of the region. This focus permitted a reflective and anecdotally enriched discussion, well grounded in the extensive field-based experience of the participants. The general theme of the discussion was the leveling effect of IT, permitting an easy horizontal sharing of information with a minimum of gatekeepers.

Conclusions

- Given the social and economic stratification in DROC, those with time and money will learn the new IT, and enclaves of excellence are likely to appear.
- IT can be used for good as well as for evil purposes.
- Donors will play a big role in training. The British already train IT-related staff for conflict and humanitarian purposes. Multilateral donor funding conditions will be instrumental in bringing about transparency applications using IT.
- Countries in Central Africa are expected to progress in use of IT at different rates of speed.
- By 2015, DROC and the rest of the sub-region will not have caught up with West Africa in the use of IT, but the participants believed the sub-region will have closed

The group was told how IT has been a boon to African students seeking opportunities to study in the United States. In most cases the placement and scholarship application process has been the dominion of a few placement organizations such as the African American Institute, and many of their sources of recruitment have been through networks often controlled by elites in established institutions. Now, potential applicants can access university information directly on the web. This web access has broadened the field by opening up opportunities for bright, less-connected applicants. The direct communication that this now affords might obviate the need for intermediary organizations that control the limited number of scholarship opportunities. It may be preferable to allow universities possessing particular training sought by East Africans to manage these funds directly.

The group discussed the importance of examining through a power lens many of the

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IT-supported initiatives in the field. Because Women-In-Development programs are able to lower their transaction costs in a variety of savings and credit schemes through the use of IT, a greater number of smaller loans have become available to a greater number of women. The horizontal communication that these technologies afford allows a free-flowing sharing of information, more participatory decisionmaking, greater networking, lessening the esoteric character of the available knowledge and building an important sense of group solidarity.

The IT uses by Fulani herders offer an example of how IT has been adopted to support customary practices in unconventional ways. The herders use the global positioning system (GPS) mapping capability to map out their grazing lands and predict potential drought conditions. They also have developed e-mail lists to raise support for local projects and lobby through sympathetic patrons to bring pressure upon government policymakers.

The Eritrean Diaspora has established many direct links with community-based organizations and community-based umbrella organizations working in regions of Eritrea that are often beyond the reach of the conventional projects and practices of development agents. Through planning and communication software developed in the United States, Eritreans have built a sophisticated planning and support delivery network, making it available to the most remote regions. In addition, the Diaspora has set up a website that provides otherwise inaccessible news and information that is often critical of the government. This has motivated the government to set up a counter website that directly responds to items presented on the Diaspora site.

Courts can also become more efficient by making information more accessible. IT can set the occasion for judicial reform as court records, data systems, judgments and cases are recorded in an accessible format. Such improvements would in turn lead to greater access, transparency, and efficiency of the system. In some cases hotlines have been established that have allowed for greater public accountability. Short of shutting down the Internet, there is no way of preventing the IT-supported transparency and information sharing that inevitably leads to good governance.

The Somali Telecom Group is an example of the leapfrog technologies that are allowing well-trained Africans to return to Somalia and apply their state-of-the-art skills in their regions. The wireless information systems are growing at a rate that is exponentially more rapid than the conventional landline phone systems. How rapidly this will grow over the next five to ten years is related to the cost/minute of on-line time; the price must be brought down, and a demonstrated successful strategy for doing this is through competition. Tied to the pricing of communications is the pricing of electric power. Computers are driven by efficient delivery of electric power. Computer-based communications could be impeded if the power sources were not there to lend support.

The case of Uganda is a good demonstration of the benefits of competition. The Government of Uganda has forced previously monopolistic communications companies to make the price competitive. The Ugandan Communications Commission (UCC) serves as a regulator that assures that all stakeholders will continue to remain involved. The regulatory commission continues to serve as a market-opening function. The Commission has managed to stay independent, and the highest level of leadership within the country

has assured its continued independence. The selection of the Director of the UCC has been key to assuring its independence.

The question about human resources was raised. How will the burgeoning bureaucracies be treated when the ledger is replaced by the microchip? What will happen when the paper pushers lose their jobs? In response, the general consensus was that open, accessible information has tended to create new jobs. Employment is an intermediate measure in technological change. Even if some people lose their jobs, we can expect greater productivity that will then create new jobs. Participants believed that tying people into global market information systems (like the coffee producers) is an important way of impacting positively upon productivity.

The matter of IT's particular impact upon women was raised. Participants agreed that by looking at the impact of IT through the lens of gender, one might gain an understanding of its power and immediacy. Questions arose concerning the assessment of impact. How does IT affect the way women gain access to sources of power, information, and tangible resources? How will IT raise the status of women and/or levels of their income? Will there be new employment opportunities for women? Good social and economic analyses will offer insights into the potential changes promised by the introduction of these new technologies. IT has the potential to overcome many of the barriers to women—as well as to other groups who have been marginalized. Similarly, IT allows for more equitable access to knowledge and information through NGOs and networks. This is not to discount the continued problems of overcoming cultural, educational, and financial barriers: the group agreed that there will have to be proactive programs for involving women and low-

income people in training and access to information services in order to bring them into the information revolution.

The best way to make IT services accessible and sustainable is to figure out how to make them break even financially. Women, farmers, and micro-entrepreneurs need information that will improve the effectiveness of the services they require (such as health or education programs, financial services, market information, and comparative pricing). There is a market for information that is now only minimally tapped. For example, local community groups are setting up independent websites to push local tourism and local products. In fact, providing information, like building roads and providing schooling, may be one of those places where low-costing through subsidies from government may be effective in stimulating local economies.

There was also a concern raised by the participants in the breakout session about the stifling of local content by the web. The general fear of globalization has its own particularities related to information sharing. How can local culture be protected from the European (or American) hegemonic content? The answer was that there has to be a conscious effort to support local content. IT could just as well encourage the propagation of local languages and culture as it could speed up their demise. It could increase ethnic identity as well as strengthen the hold of dominant cultures. Systems must be put in place that will protect local intellectual property in music, information, and culture of all kinds. The technological inputs needed for producing local content have become so readily available that it has become possible to produce locally generated material at a very low cost.

In many ways, IT has served as an analog for the building of democratic institutions. Participants noted that IT allows for free flow of information, leveling of the playing field, and transparency in governance. The biggest assistance to opening up of the information flow of the Internet is consumer pressure. It would be important for us to be able to gain a better understanding of the village-level awareness and use of IT. This kind of awareness will drive the content and rate of expanding accessibility of the Internet. Who are the gatekeepers? How much is understood about the use of IT? How far down is its reach? What are the practices being constructed around IT? How does IT fit with conventional means of handling communication? What is IT's impact upon literacy? How much support does it have? The African experience may be quite different from that of developed countries. For example, one case was described in Africa in which e-mail is handled as those in the United States might handle a telex or fax: one person sits at the computer and sends and receives messages for others.

The Internet Exchange Point (IEP) in Kenya was discussed as an interesting case study, because of dramatic success in preventing its squelching by the government regulatory authority. The IEP had a strong enough constituency that supported it as it brought suit against the government's action. This support allowed the IEP to win the case and continue and to serve a growing audience. Such initiatives that move control of communication and information away from centralized authority could just as well lead to a backlash from those holding the reins of political power.

Many believe that the emerging new information and communication technologies carry within them the capability to regulate themselves. On the other hand, others believe

that we cannot depend upon self-regulation to be handled by market forces; the private sector would pick the easy fruits of this technological revolution and leave the governments to address many of the tougher social issues that are left hanging. Considerable weight must be given to these issues. It was the group consensus that the workshop was very effective in addressing many of these issues and this meeting should lead to further research and expansion of the policy discussions.

West Africa: Focus on Nigeria

The participants in this breakout session noted that it has only been two and a half years since Nigeria emerged from unprecedented military plundering and the ensuing destruction of institutions of governance. During the previous period the country suffered a vast exodus and export of talent, and corruption reached previously uncharted levels. These factors fed a social fragmentation, leading to increased internal violence.

The participants agreed on the following main points:

- The oil dividend had been very significant until recently; Obasanjo had a large dividend, but this was mostly squandered.
- The renewed electoral cycle will lead to manipulation of the economy, etc., in preparation for the 2003 elections.
- The US position vis-a-vis the bilateral relationship has changed drastically—first during the Abubakar era and into this government. The relationship became multi-faceted and high level, and remains a focus of the Bush Administration.

West Africa: Focus on Nigeria



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- Post 11 September—with *Sharia* observed in northern Nigeria (where some sentiment favors and links exist to al-Qa'ida)—there may be even greater attention on the US-Nigeria bilateral relationship.
- Nigeria is playing an important role in the New African Initiative, and it has therefore become a symbol of Obasanjo's ascendant diplomacy, though he has drawn some fire on this domestically.
- Donor assistance has played an integral role helping restructure military and police, as well as in enabling electoral transitions, and will continue to be very important.

Discussion

- Nigeria is unique in the amount of decentralization to the states. Generally, a fair amount of decentralization has occurred, and there is now a certain amount of freedom at the state level in communications policy.
- Lack of cohesion is not a recent development in Nigeria; one might suggest the need for a national or sovereign conference.
- The US expects to receive 40 percent of its oil from Angola and Nigeria in the next few years—indeed, US oil imports from Nigeria are expected to exceed imports from Saudi Arabia, and this situation creates a complex issue. The oil revenues in Nigeria feed the corruption. Meanwhile, most Nigerians have to queue up for petrol.

In the IT sector the head of the Nigerian regulatory agency provides a good example of what a strong regulator can do. However, Nigeria is very far behind, with a very low

teledensity and, generally, a poor situation. Nigeria did open up competition for mobile wireless, and awarded four licenses (\$265 million per license), of which two companies have begun operating. The growth rate looks very promising.

Other points mentioned by the participants include:

- NITEL⁷ appears virtually worthless but had teamed up with Vodaphone for a wireless operation.
- Nigeria may develop a wireless telecom infrastructure.
- The Internet has a fairly strong base in Nigeria, although there is a lack of good international connections. There is a fairly competitive ISP market. A bottoms-up approach is suited to Nigeria—approaches requiring strong central planning will not work there.
- Although 80 percent of the people live outside the cities, the reach of telecommunications is limited to the major urban centers; most lines are in Lagos and those lines are often non-functional. In the rural areas, travel of 50 km to a pay phone is average.
- Nigeria should build IT infrastructure in a decentralized way; small local companies can bring IT to the rural areas. The Nigeria Telecom Regulator accepted this reality and wants to embark on an approach to stimulate such decentralization. This initiative would finance rural telephone connectivity through a private-sector fund to work directly with communities. Such an approach may, in fact, be needed, because

⁷ Nigeria's government-owned telecommunications parastatal.

of community mistrust of federal or state-generated initiatives.

- Without connectivity, IT applications will not proliferate to rural areas. One would wish for a federal government initiative to improve rural connectivity. Deregulation with a development objective is needed (in contrast with what occurred in South Africa).
- Some participants noted that the issue should not be developing the widest possible range of telephone connectivity; rather, emphasis should be on enhancing nodes of connectivity to disseminate information widely to the rural population through other means (radio, etc.).
- The distinction should be made between “universal service” and “universal access.” If one can enable reasonable access, one can accomplish a great deal.
- Communications facilities can be used to achieve other development objectives; one must consider the economic impact and possibilities of IT. One cannot have broad scale e-commerce, etc., until the basic structure is in place. The participants hoped that Nigeria—through policy—will seek to establish the conditions conducive to the rapid growth of the telecommunications infrastructure. (In South Africa growth was preordained in a central way—an approach that has been less than successful.)
- Where is the initiative and leadership at this point? Push-pull—a fair number of Nigerians are starting to go back: perhaps most obviously, people have returned to launch enterprises like Internet cafes.
- Problems include lack of bandwidth, speed, energy (power outages), and

Nigerian organizations’ consequent need to buy other equipment to back up their work.

- Complications also extend to intellectual property issues. Nigerians cannot buy software easily. Many are unable to use credit cards online. Internationally, there is a common assumption that if it's from Nigeria it's a scam; there is a great deal of pirating. Cost and affordability on a sustained basis are of concern. Maintaining the IT infrastructure requires human resources; the training business is growing but is not yet at the level of troubleshooting.
- State governments are coordinating with some Internet entrepreneurs; a potential problem is diversity among choices that states make versus the need for national compatibility.

NITEL is not really a monopoly; and some liberalization is occurring. Telecenters and VSAT lines are being initiated. There is no longer exclusivity with INTELSAT. Still, NITEL has a problem providing trunk capacity for traffic back into Nigeria: call handling ability is limited. It is very expensive to obtain a multi-operator VSAT license (over \$100,000). Regulators have a limited ability to regulate. Although state governments are very supportive and proactive, they have not made any effort to regulate; as a result there is a potential for fraud. *Sharia* may affect freedom of the press in some of the *Sharia* states.

It was suggested that Nigeria is working more effectively at the state level than at the national level. Why? One answer lies in Nigeria's history; Nigeria went into a civil war as a normal developing country and emerged oil-rich and under a military regime. Domination of the north is a factor.

Competition over resources leads to neglect of development priorities. States were created to promote local development and are now not just fighting for a piece of the central pot; this is a different approach.

Another, more optimistic, dynamic was discussed, involving liberalization of media, return of many exiles to Nigerian cities, and a more "outward looking" Nigeria.

To what country can Nigeria be compared? Indonesia? Ukraine and Colombia? Are these going through similar processes? Strong monopolies exist in Indonesia. Nigerian bureaucracy is easier to deal with than Indonesia's bureaucracy. Brazil provides a historical comparison at best, as Brazil is now a very wired country.

Nigeria faces a high deficit: it appears to be in the early stages of significant movement forward, but such development is in the early stages. It should be noted that the IT sector is making better progress than other sectors, perhaps because IT is led by the private sector.

What will come with the next election? The result probably will be too much concentration on elections and not enough on long-term provision of services.

An ethical and policy issue was discussed: The Internet is aimed at the elite, modeled more or less along the lines of its development in the United States: would a policy emphasis on the Internet irrevocably put us on the side of elite groups? In response, it was noted that we are not operating in a total vacuum; there is a national IT policy allocating two percent of core government budget to supporting incubation of IT in small to medium-sized enterprises (SMEs) and similar activities. The most recent Minister of Science and Technology

came from the private sector, and wasn't very good at networking; President Obasanjo wanted to put the IT policy on hold, and the Minister resigned, shocking Obasanjo.

The difficulty will be in the details. However, IT policy is not something that comes just from the Minister; it emerges from a larger stakeholder process. When the Minister resigned, the hue and cry helped to force a government reaction.

Much of what we've seen has been the result of our engagement since the transition to Obasanjo. The development in Nigeria counts as one of the successes of our policies. What's the proof of our engagement? The measure of our impact? It is the willingness of leadership to take positions that they previously could not take.

Some other points made include:

- Cultural impediments exist, such as the reticence of family firms to open up; Nigerians often do not want to work outside groups with whom they are comfortable.
- What about the production of data that happens in other countries—the service base—could it not happen in Nigeria? There is an educational base and human capital conducive to such development.
- What are the prospects for regional cooperation? Nigeria will have to deal with the reality of a Francophone-Anglophone split in West Africa. The Economic Community of West African States (ECOWAS) is clearly the group to work with.
- Many West Africans are resentful of Nigeria's dominant role in the region. If work is conducted through ECOWAS, it

should involve committees with members from many countries.

- What has been the impact of culture? Politics and religion can be a dividing issue when working in a multicultural system: this is much more of a problem in Nigeria today than it was a couple of years ago. Some cultures in Nigeria are more aggressive and oriented toward bargaining.

What are the great unknowns facing Nigerian policy?

- Will concentration on politics interfere with movement toward decentralization?
- Will there be increased social conflict (inter-ethnic, religious, etc.)?
- Can the Internet proceed, like the oil sector, in spite of the effects of violence?
- What will be the course and effect of the push towards *Sharia* law? Toward control of information?
- How will the level of violence affect government attitudes toward information and its regulation?
- Will the government carry through with changes in telephony?
- Will the government deal with energy issues?
- Will the privatization of NITEL continue (a deeply controversial issue)?
- Will there be over-regulation of new investments in wireless?
- To what extent will the Internet and other forms of IT be diffused and used in schools?

- What will be the progress in e-commerce?

The following points were made about the general economic climate:

- Its reputation for crime and corruption create a challenge for Nigeria's development of e-commerce and indeed pose a huge barrier to legitimate business. Are Diaspora people using e-commerce applications in Nigeria?
- The security burden on the economy discourages foreign investors.
- The national IT policy will be helpful, if it makes it through the Senate.
- Although one has to be concerned by the level of foreign investment coming in—the private sector still supports the premise that there are reasons to invest—one should not sell short the capacity of Nigeria to generate investment.

Francophone vs. Anglophone: the Great Divide?

ECOWAS and its secretariat have made significant progress so far, particularly on the gas pipeline in the energy sector. However, the pipeline would terminate in Ghana, involving four countries, which would require cooperation throughout the region. Also, it was not clear whether the pipeline would be on or offshore. This whole program is linked to power generation, and the program could allow Ghana to solve some of the severe power problems it has had. The president of Ghana seems determined to move on the energy front: he is a reformist, private sector-oriented leader, like others that have come recently to power in the region. The region has therefore tried to cooperate on economic development issues, particularly energy issues.

On the IT side, things are less clear, though the electricity generation issue has direct implications for IT. How important is electricity for IT development? Is there support for a broader regional integrated environment regarding financial flows, etc.?

What is the likely impact of the CFA franc⁸—a common currency of the region? (Recent events indicate a drop in resources to developing countries, but the CFA will probably be less affected.) It was suggested that the common currency could have significant impact on e-commerce and the international transfer of funds. Transactions could be made across boundaries of the CFA countries without changing currency. Moreover, the CFA franc is linked to the French franc and therefore to the EU: to hard currency. But in Mali, for example, businesses have trouble converting to hard currency to buy IT equipment internationally.

Perhaps what has happened in COMESA and SADC will happen in West Africa. The example of Senegal, which has made huge advances internally, may be constructive. Would Senegal be the driver of a regional effort? The leaders are in Ghana and Senegal and are in the front line of upgrading cables and such relating to IT. These countries will have all the coastal states linked by one cable, but it will be interesting to see which coastal countries have not yet bought into the project, not to mention the landlocked countries.

What role would Nigeria play in this program? If Ghana and Senegal are the countries that will have the greatest coherence and motive for regional cooperation, people in Nigeria will be looking at the market benefits. The regional “hegemon” is the laggard in this case, unlike in Southern Africa where South Africa is the leader.

⁸ CFA franc is a Francophone African currency which is convertible into French francs.

There are all kinds of peacekeeping efforts that cut across the Francophone/Anglophone divide. But what about IT? There are people focusing on one or the other, but the Anglophone side is stronger because of the Nigerian market. The focus on the international side is Nigeria and Ghana and a little bit of Senegal and Côte d’Ivoire. Mali, Niger, and Chad have little to add in terms of natural resources. An association of Telecom operators exists in the region that cuts across Francophone and Anglophone countries.

In Côte d’Ivoire, the Central Bank tends to have a regional program now, thinking about integration. Seven or eight countries are involved, most of which are Francophone. More Francophones speak English than the reverse, although there are quite a few Nigerians trying to speak French. There will probably be two strategies in West Africa: it is not so much the differences in language that causes the barrier, but the cultures behind them. The Anglophones are much more direct and entrepreneurial while the Francophones are slower, more theoretical, and more bureaucratic. France may not have as much interest as before—not much oil and other natural resources. Infrastructure in the Francophone countries is basically in French private hands, and major agribusiness tends to be Francophone. Mining is mainly Anglophone countries coming in. A system of credit cards based on CFA is to be used in the region; Ghana, which is not using CFA, needs to be included and negotiations are underway on that issue. The CFA franc is widely accepted as a currency in the region.

On the coastal states, there seems to be an acknowledgement of the need to be entrepreneurial and to do things more quickly. The Internet instills that culture. Is it possible, at least with respect to Senegal, and perhaps Côte d’Ivoire, that there might there be movement away from the stereotypical

approach? In Côte d'Ivoire, the government has the political will, and the private sector is actually doing much more to organize itself into IT networks—the private sector is ready for any incentive to make IT advances happen. At the policy level, however, the process is very slow. Things that were prepared under now deposed President Henri Konan Bedie have fallen by the wayside; and the third government consisted of mainly university professors. So the private sector is moving a lot faster than the government. There is now a minister of ITC, but what does that mean in terms of concrete action? The private sector for the most part is composed of foreign corporations, though there are a fair number of Ivorians. Until now, most private companies have been 50 percent French-owned.

In terms of education, more French software is needed for the Francophone countries. There is more content in English, so there now is a need for French-speaking people to learn English—and it is taught in elementary school. An American standard university will open in September 2002, and it will be bilingual, though classes will be in English.

Discussion Highlights

There are barrier issues in West Africa that only exist there. Among them:

- ECOWAS is relatively weak, not very far along in picking up the IT issue and driving it.
- There is a coastal (rich) versus landlocked (poor) gap.
- Regional insecurity—there is a regionalized war and it is a special factor. It is intractable and resistant to peacekeeping. The war is a deterrent to investment since spending goes to training the military rather than into IT.

- Nigeria, by far the largest country in the region, is a laggard in the IT revolution, and is not outward looking.
- The Franco/Anglo divide.

The Ghana and Senegal cases may be considered: two democratically governed, market-oriented economies getting savvy on IT issues, where the situation is characterized by dynamism. Côte d'Ivoire has had periods of dynamism and leadership. There is the potentially large size of the Nigerian market—but how do you get to it? Nigeria has oil and could be producing large amounts, generating a considerable income. There is a de facto coastal linkage in the region already—steps are being taken to establish a network (cable), which is laying the groundwork for further steps. ECOWAS is acutely keyed to energy problems.

What about mass media? Deregulation of radio has occurred in Mali but is uncommon in the rest of West Africa. Dramatic resurgence of independent media has occurred in all the environments that have been liberalized, certainly in Ghana and Senegal. In Côte d'Ivoire, people use cassette videos. One political party has used this for propaganda, spreading to the rural areas. The use of the technology has increased the social fracture between north and south; mass media in certain circumstances can be detrimental, and this is true of IT in general. So, while IT can promote growth and jobs, etc., it can be used for nefarious purposes as well. Misuse of technology clearly is a very serious issue with the Internet. *The Economist* has had articles about the geography of the Internet—geography may be a lot more important than people realize. Thus, the debate over whether or not to regulate the Internet is serious, and the decision may have serious consequences. Another issue is costing, as when people use the Internet to get less expensive

communications. The need in West Africa is so great that we tend to turn a blind eye to the dangerous consequences to the spread of IT. This region has potential for actual conflict; the role of IT in adding fuel to the fire should not be ignored.

What will the IT revolution do in terms of trade? The production of IT-intensive products (such as jet aircraft, new pharmaceutical products and international banking services) is increasingly dominated by rich countries. The technological and entrepreneurial skills to produce such goods and services tend to be very localized in developed countries; African countries are often limited to roles as suppliers of primary goods. The Internet expands the market for such goods and more developing countries compete for the same export markets. Who is going to have more power in international markets for such primary goods, the consumers or the suppliers? The developed country purchasers of primary products will perhaps use their technological power to better exploit the market, while the increased competition among developing country suppliers may help to drive prices down. It could happen that the price of knowledge-intensive goods will go up while that of the primary products produced in Africa goes down; the economic implications of such trends for West Africa are very much of concern. IT is also being used to promote tourism, for example, which is revenue-producing.

The Japanese and Italians have used the Internet to go for the best price they can get for the product. The missing word is competitiveness, and the Internet is definitely driving competition. Any buyer can seek the best prices (which also will include transport). IT can open up new markets, but if you have a bottleneck, you can't get goods in and out of ports in time and you can't get from an airport

to a place to do business, buyers will go elsewhere. IT is exacerbating the need to be competitive in Africa.

Panel V: Implications for Policymakers

Recognizing the importance of politics and policy in the implementation of IT, this session addressed those key issues that will profoundly impact the whole process of diffusing the technology itself. The presenters not only referenced those areas affecting the US Government and private sector but also African leaders and nonstate actors.

Key Issues for African Policymakers

In considering implications for policymakers, one should recognize that, in Africa, governments are fairly peripheral with regard to population. Indeed, the role of government may be negative, keeping competition down and prices high.

Technology is perhaps not the problem. Lack of meritocracy, lack of security, and strife are often more important. The electrical infrastructure is poor; transportation infrastructure is also inadequate, not only in terms of roads, but also airports and air travel. Populations are fragmented ethnically, linguistically, and economically.

One priority is to improve awareness. Provide heads of state and leaders at all levels with a satellite dish and a link to the Internet. The areas of agriculture and natural resource management are critically important but do not receive much support from donors. There is too much inefficient use of existing capacity, which suggests a need to increase awareness of good practice.

Regulators need to do a lot of work. The educational system, from primary schools on up, needs to strengthen efforts all the way from computer literacy training to the conduct of research and experimental development. The African IT Educational Trust, headed by

Graça Machel, the wife of Nelson Mandela, has a program for incubation facilities that might be emulated.

Models of deregulation should be improved. The rural telecom experience appears to have been unprofitable and should be questioned. South Africa's model for rural connectivity seems not to have been good and should not be replicated.

It sometimes appears that there exists an inverse relationship in Africa between the strength of economy and progressiveness of IT policies. As they privatize public telecom operations, governments often look to the transaction as a revenue source, and in consequence appear to be negotiating long-term contracts, which will be counter-productive in the long run. These governments would be well advised to seek more taxes over the long run from an improved economy rather than an immediate fee for license.

There are a number of interesting specific technological opportunities. One is hybrid technology to get Internet connectivity to people with TVs. A national Internet calling number has already been initiated in many countries but should be available everywhere in Africa.

The cost of local calls remains too high in much of Africa. Further deregulation is needed, even if only for data purposes—data nets don't threaten voice service providers. License fees are often too high: in Zambia the ISP fee is \$40,000. VSAT licenses are also usually priced far too high, as are mobile and other telecom licenses. Moreover, the licensing process is usually too slow. Import duties are imposed for some equipment for which tax-free importation would be more conducive to development. There is also a need for provision of access to broadcasting

licenses, especially licenses for community broadcasting.

Donors seem to have focused attention on South Africa, but they should also look at advanced countries in North Africa, such as Morocco, Tunisia, and Egypt. Further, local applications, such as those in government, deserve more support. Replication of studies should be reduced and funds allocated for action and implementation instead. Finally, donors should heed lessons learned.

A West African Perspective

The world probably is a long way from a situation in which we can fully assess the impacts of IT. Still, it is necessary to develop national policies, with the participation of all stakeholders, to promote equal access. Local content and content in local languages should be a priority for donor agencies, as should be databases on all aspects of society and development. Training on IT should be emphasized in all aspects of national curricula. Centers of Excellence for manpower development are needed everywhere; development of human resources should be included in all plans for IT development. The needs of the disenfranchised should be met: programs should be gender-sensitive, appropriate to Africa's multilingual and multicultural environment, and include rural areas. Networks must be responsive to people's needs. Flexible pricing of telecommunications and Internet services is needed to stimulate demand in rural and poor locales. Scientific and technological knowledge must be emphasized. More importantly however, the key to successful IT development will be national strategies that involve all sectors in the use of IT, and avoid risk of social exclusion.

Focusing on Regulatory Agencies

Determining which direction to take in helping countries to improve IT connectivity depends on whether the government in the country owns and operates the telecommunications businesses, or whether the industry is private and simply regulated by the government; that is, whether or not the government is itself an enterprise in the telecommunications business.

Governments That Are *Not* in the IT Business

Countries that are clearly privatizing their state IT companies and have set up truly independent regulators deserve all the positive assistance that can be offered.

- Strengthening regulators is the real key to success in IT development. Regulators, by definition, always have to consider the public interest. Regulators should be independent; the South African experience conclusively demonstrated the problem that arises when the privatizing state has difficulty relinquishing control of the regulation process. It needs to be recalled that the state was the previous regulator in countries just now establishing independent regulators.
- Other opportunities are in basic education for such disciplines as law (regulations are secondary legislation) and spectrum engineering.
- Opportunities can be offered during the national privatization process. For example, US Trade and Development Agency technical assistance funding coupled with US Telecommunications Training Institute training can be provided to a US company that succeeds in buying into the entity being privatized. Note that the privatizing government should have

no say in the operation of the technical assistance once it is in place.

- Success in the competitive US environment should translate into success in competition in foreign countries. Such companies can therefore provide excellent examples of the value of competition to economic development.
- A new US investor often finds himself or herself in a monopoly situation. It seems to be important that US policy should recognize that in such cases the new investor should be encouraged to appreciate the pro-competitive stance of the United States and should be encouraged to not become completely enamored with the monopoly situation in which it finds itself.

Governments That *Are* in the IT Business

In African countries, the lack of information technology infrastructure is by and large due to the fact that governments themselves are charged with responsibility for delivering dial tone. In this they have generally failed.

- The government telecommunications enterprises rely instead on making money by low volumes and high prices: this policy has been a recipe for disaster. The following policy recommendations are intended to help Africa rid itself of the idea of government being in the business of making money instead of the business of governance.
- Foreign investors should not give more favorable conditions to government-owned enterprises than to private enterprises.
- The policy, perhaps at the highest level, should make a clear distinction between entities in Africa that are owned by the

private sector and those in the majority owned by governments. The entities owned by a government are clearly instruments of the specific African government, and, as such, their dealings in the US and other foreign governments should go through the proper government channels. It is not enough for them to register with the FCC and then go about their business as if they are not instruments of a foreign state.

- The sanctions provisions of the World Trade Organization (WTO) should be applied to the fullest extent with respect to state-owned companies where the latter digress from their owning government's WTO commitments.
- Telecommunications policies of foreign governments should appear to encourage the growth of private sector companies in African countries. It should be stressed to African governments, those that do own and operate information technology businesses, that the foreign government investment policy is to encourage private sector growth.

Implications for US Foreign Policy

Africa is not—especially after 11 September—at the top of the US policy agenda. The case must be made that key US policy goals—security, economic, political—can be attained in Africa. In particular, the case must be made that US policy objectives can be achieved through IT and information resource programs. Keys to making this case will be:

- Focusing policymakers' attention not only on the degree of threat to US interests, but also on the opportunities to enhance those interests.

- Showing how IT/IR relate to security, economic, democracy, and development goals.
- Devising IT/IR strategies that are relatively low cost/high return and which use entry points and leverage to attain several US objectives at once: for example, airport security and support for regional organizations.

Some specific comments can be made about US policy relevant to IT in Africa. The United States can achieve several objectives in the region through support for IT efforts of regional and continental organizations. Thus, ECOWAS plays a key role in regional security in West Africa (military, drugs, terrorism), as well as in economic integration, democracy, and development; supporting the region's IT programs helps to achieve these various objectives. There is also now an opportunity to help shape a new African Union.

Security controls have become especially significant in the aftermath of 11 September. IT can play a role in improving airport security. Indeed, the security of the information infrastructure itself is a key issue in Africa, as elsewhere.

Economic reforms are critical to US policy in Africa. Such reforms are supported by Internet applications for financial and other control; indeed, such applications might be required in IMF and International Bank for Reconstruction and Development programs. The Leland II program is likely to be especially useful in promoting reforms, since it focuses on strengthening regulators.

As the United States seeks to promote democracy in Africa, there is an important role for IT. Certainly appropriate information technology can help make elections more

efficient and transparent and improve the speed with which election results are published. IT applications in education can improve voter understanding, as can the use of IT to post and disseminate content on election issues.

In the area of economic development, the leapfrog to wireless communications has helped to overcome the barriers created by the weak wire-based telecommunications infrastructure. IT is proving invaluable in the efforts to reduce the spread of AIDS, to improve agriculture, and to improve productivity in other sectors. Content relevant to African needs and demands is the key limitation to achieving such development benefits.

In short, IT is important to both politics and policy. In Africa, IT can change and determine the four "Cs" that have been discussed: Control, Culture, Competence, and Capital. Nigerian decentralization provides a good example of a situation in which assistance in IT provides a low-cost, highly leveraged approach to simultaneously achieving several purposes of the United States. Similarly, the Leland II program of USAID provides a low-cost approach to building capacity important to many US objectives in Africa. Our objectives would also be well served were the developed world to:

- Provide support for the Association of Telecommunications Regulators.
- Work to assure African ownership of the development content placed on the Internet.
- Recognize and support African universities as sustainable delivery mechanisms for IT development.

The bottom line is to “get the process right,” even if, as sometimes happens in Africa, projects and programs must be aborted. If the process is right, the stakeholders will remain and ultimately will be able to make IT initiatives work.

The biggest change in Africa is the coming of age, to both influence and power, of a new, globally-oriented generation. This generation includes the natural allies of the United States, our natural economic and political partners. IT is the ideal vector to support and empower these future leaders.

