ICT for Teaching, Learning, and Research—A Workshop for African Universities

SECURING THE LINCHPIN

29 July–1 August 2002
United Nations International Conference Center
Addis Ababa, Ethiopia

Organized by the Partnership for Higher Education in Africa
In Collaboration with the United Nations Economic Commission for Africa
The Changing Nature of Web Sites
Those familiar with the Internet are also knowledgeable about the way Web sites change their addresses, go down temporarily, or disappear altogether. We made every attempt to verify URLs, but cannot guarantee that every address will remain the same.
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Glossary and Abbreviations

**Bandwidth**

Bandwidth measures how much information can be carried in a given time period (usually a second) over a wired or wireless communications link. In digital systems, bandwidth is expressed as bits (of data) per second.

**Bps**

Bits per second. In data communications, bits per second (abbreviated Bps) is a common measure of data speed for computer modems and transmission carriers. As the term implies, the speed in Bps is equal to the number of bits transmitted or received each second. Other measures include Kbps (Kilobits per second) and Mbps (megabits per second). One kilobit per second is equal to 1,000 Bps. One Mbps is equal to 1,000,000 Bps or 1,000 Kbps.

**DE**

Distance Education

**DSL**

Digital Subscriber Line. DSL technology delivers high-speed Internet access.

**Fiber Optic Cable**

Fiber optic technology uses glass (or plastic) threads (fibers) to transmit data. A fiber optic cable consists of a bundle of glass threads, each of which is capable of transmitting messages modulated onto light waves.

It has several advantages over traditional metal communications lines:

- Fiber optic cables have a much greater bandwidth than metal cables. This means that they can carry more data.
- Fiber optic cables are less susceptible than metal cables to interference.
- Fiber optic cables are much thinner and lighter than metal wires.
- Data can be transmitted digitally (the natural form for computer data) rather than analogically.

**Frame Relay**

Data transmission technique used to send digital information such as voice, data, local area network (LAN), and wide area network (WAN) traffic quickly and cost-efficiently to many destinations from one port.

**GPRS**

General Packet Radio Service. A service that allows information to be sent and received via a mobile telephone network.

**Hit**

Term used to describe the number of times a user visits a Web page.

**HTML**

Hypertext Markup Language, one of the languages used to tag various parts of a Web document so browsing software will know how to display that document's links, text, graphics and attached media.

**ICT**

Information and communications technologies.
Intranet
Web-based information stored on a local server that is available to everyone with a network connection to the server.

IP
Internet Protocol. IP refers to the set of communication standards that control communications activity on the Internet. An IP address is the number assigned to any Internet-connected computer (See TCP/IP below).

IPR
Intellectual Property Rights. Creative ideas and expressions that have commercial value and receive the legal protection of a property right. The major legal mechanisms for protecting intellectual property rights are copyrights, patents, and trademarks. Intellectual property rights enable owners to select who may access and use their property and to protect it from unauthorized use.

ISDN
Integrated Services Digital Network. ISDN is a set of standards for digital transmission over ordinary telephone copper wire as well as over other media. Users who install an ISDN adapter (in place of a modem) can see highly-graphic Web pages arriving very quickly. ISDN requires adapters at both ends of the transmission so your access provider also needs an ISDN adapter.

Ku-band
Pronounced "Kay-you band". One of two common satellite frequency bands (C-band is the other). Ku-band earth stations use the 14 GHz frequency band to transmit and the 12 GHz frequency band to receive.

LAN
Local Area Network

NEPAD
New Partnership for Africa’s Development

NICI
National Information and Communications Infrastructure.

OPAC
Online Public Access Catalogue. An online bibliography of a library collection that is available to the public via computers.

POP
Point of Presence. POP is a service provider's location for connecting to users. Generally, POPs refer to the location where people can dial into the provider's host computer. Most providers have several POPs to allow low-cost access via telephone lines.

TCP/IP
Transmission Control Protocol/Internet Protocol. TCP/IP is the basic communication language or protocol of the Internet.

VSAT
Very Small Aperture Terminal. A satellite communications system that handles data, voice, and video signals.

University of Dar es Salaam VSAT
Photo courtesy of UDSM Computer Centre
Introduction

The Partnership for Higher Education in Africa

The Partnership for Higher Education in Africa, launched in May 2000, represents a belief in the importance and viability of higher education in Africa together with a commitment to its support. Four major US foundations joined together in the establishment of this initiative—Carnegie Corporation of New York, The Ford Foundation, the John D. and Catherine T. MacArthur Foundation, and the Rockefeller Foundation.

Among its objectives, the Partnership aims to:

- Generate and share information about African university and higher education issues
- Discuss strategies for supporting universities
- Support universities seeking to transform themselves
- Encourage networking among innovative African university leaders and higher education experts
- Distill and share lessons learned from grantmaking
- Advocate wider recognition of the importance of universities to African development

The Partnership has selected six African countries undergoing systemic public policy reform in which to concentrate—Ghana, Mozambique, Nigeria, South Africa, Tanzania, and Uganda. Universities in these countries now have a hospitable environment in which to innovate and to transform themselves. In short, public renewal has led to institutional renewal. Although other countries and universities in Africa meet this criterion, the six Partnership countries were also chosen because two or more of the Partnership foundations are providing support to universities in them.¹

ICT as the Linchpin of Excellence

Just as a linchpin keeps a wheel in place, Information and Communications Technologies (ICT) are essential to the running of universities. Early on the universities that the Partnership supports recognized the pressing need to improve their ICT infrastructure and utilization. ICT can enhance effective teaching, learning, and research in Africa, as it does elsewhere in the world. It can reduce distances, virtually if not physically, thus providing African scholars with easier access to and input into the world of international scholarship—nationally, across the continent, and internationally. ICT is not a technical fix, however. It is a tool for users and its people and needs-driven. This report therefore emphasizes people power as much as it does technology.

¹ See the Partnership Web site for further information: http://www.foundation-partnership.org or write Lisbeth Levey, Partnership Facilitator, at the address given in Appendix One.
Each of the four Partnership foundations supports ICT for its university grantees in a number of ways. Some examples include:

<table>
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<tr>
<th>Foundation</th>
<th>Examples of ICT Support</th>
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| Carnegie Corporation| • Grants to and for Nigerian universities to include ICT components in planning grants and support to the University of Iowa (UI) to enable Nigerian university staff to participate in a technology tour and workshops at UI.  
• ICT support at the University of Dar es Salaam, Makerere University, and the University of Ghana, Legon.  
• Support for a partnership of universities and “technikons” (higher technical institutes) in South Africa’s Western Cape Province to research and disseminate the application of ICT to achieve quality and equity in higher education in South Africa.  
• Support for participants attending a curriculum co-design workshop at the University of Dar es Salaam, organized by Professor Pearl Robinson of Tufts University. |
| Ford Foundation     | • Support to the Association of African Universities (AAU) to create the Database of African Theses and Dissertations (DATAD). DATAD is being implemented in 11 African universities and the Council for the Development of the Social Sciences in Africa (CODESRIA).²  
• Support to the Inter-University Council of East Africa (IUCEA) to create a local area network at its Kampala secretariat, create aWeb site, and survey ICT capacity of member universities.  
• Support to Tufts University to collaborate with Makerere University and the University of Dar es Salaam on the creation and teaching of an electronic curriculum in international relations.  
• Support to the Faculty of Agronomy of Eduardo Mondlane University to modernize and increase the capacity of its computer labs and computerize its library. Also in Mozambique, support to the Historical Archives to begin digitizing its collections. |
| MacArthur Foundation| • MacArthur Foundation funding focuses on four universities in Nigeria—Ahmadu Bello University, Bayero University, the University of Ibadan, and the University of Port Harcourt.  
• The universities have independently determined that the bulk of their grants from the Foundation should involve support for university efforts to create ICT strategic plans, to purchase equipment, and to develop skills in the use of these technologies.  
• A grant to the WiderNet project at UI for ICT training in the US and Nigeria for Nigerian university staff and to assist universities in the development of ICT infrastructure.³ |
| Rockefeller Foundation| • Support for DATAD.  
• Partial support for the University of Dar es Salaam “Smart Card” system. |

² See http://www.aau.org/datad for more information.  
³ See http://www.widernet.org for more information.
Cognizant of the substantial opportunities that ICT can provide to African universities, the Partnership decided to organize its first thematic conference on this topic. But ICT can mean something to everyone; it cuts across every university operation—from administration and management to academic applications. We therefore narrowed down the topic and decided to focus on using ICT for effective teaching, learning, and research.

At the outset, we asked the United Nations Economic Commission for Africa (UNECA) whether it would like to collaborate with us on this workshop. UNECA played an early and critical role in implementing ICT on the continent—first in establishing the Pan African Development Information System (PADIS) and then in launching the African Information Society Initiative.4

<table>
<thead>
<tr>
<th>AISI was adopted and endorsed by:</th>
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<tbody>
<tr>
<td>• The 22nd meeting of the UNECA Conference of Ministers in May 1996.</td>
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<td>• The OAU Council of Ministers Meeting in July 1996.</td>
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<td>• The African Regional Telecommunication Development Conference in May 1996.</td>
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<td>• The G8 Summit in Denver in May 1997.</td>
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</table>

UNECA launched AISI in 1996 to stimulate interest in ICT for development in Africa and to encourage the creation of national ICT policies and strategies on the continent. It had its genesis in a meeting the previous year at UNECA, which brought together computer and telecommunications experts from 38 African countries. An ICT High-Level Working Group was created at this meeting, which drafted the AISI concept. It was adopted by the Conference of Ministers the following year.

Conference Participants

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<tr>
<th>Welcoming remarks by Lalla Ben Barka, Deputy Executive Secretary, UNECA</th>
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<tr>
<td>“This meeting brings together two very important and crosscutting sectors: that of education and ICTs—widely recognized as priority areas by all of us. Two significant world events have also emphasized this. In his Millennium Report, the UN Secretary General, Kofi Anan, identified pressing challenges faced by the world’s peoples and proposed a number of priorities...This led to the Millenium Development Goals, which include education and the digital revolution. Furthermore, the World Education Forum held in Dakar, Senegal in April 2000 emphasized the need to promote ICT as a means to harness Education for All goals.”</td>
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Conference participants were selected from the countries and universities in which the Partnership foundations work. We also invited two regional organizations with an interest in ICT—the AAU and the IUCEA. A few resource people, with proficiency in using ICT for distance education and for information access were invited as well. We were also fortunate to have a number of key staff from UNECA with us who provided a context to continent-wide processes. In all, participants around the table came from eight African countries—Ethiopia, Ghana, Mozambique, Namibia, Nigeria, Tanzania, South Africa, and Tanzania—the UK, and the United States.

Participants included senior administrators, “techies,” librarians, academics, and program staff of the four foundations. Everyone wore multiple hats, which enhanced the overall quality of the meeting and our feeling of expertise. A full participants’ list is found in Appendix One.

Overview of the Agenda

The agenda included presentations and discussions on the overall status of ICT implementation nationally and at participating universities; the work of regional and pan-African associations; using ICT for distance education and academic applications; and criteria for selecting different kinds of electronic media. The large group broke into small thematic groups twice a day. We originally intended to devote the last day of the meeting to "electives," but the small group sessions were so productive that we continued them into the third day and focused on priority setting and recommendations.5

5 The workshop agenda will be found in Appendix Two.
A Bit of ICT History

The six Partnership countries run the gamut in terms of their ICT capacity, as do the universities represented at the meeting. Some are located in countries with considerable ICT infrastructure, such as South Africa, while the Nigerian universities are just now recovering from decades of neglect. Universities in all of the Partnership countries have been at the forefront of ICT development and utilization in their countries. Some historical information may be in order here:

Ghana

In 1995, the Balme Library of the University of Ghana, Legon, became responsible for a nationwide Fidonet store-and-forward email system, which was funded through the PADIS. This network was one of the first in Ghana.6

Mozambique

Mozambique became the second country in sub-Saharan Africa outside of South Africa to achieve full Internet connectivity when Eduardo Mondlane University (UEM) went online in 1995 with a connection to Rhodes University in South Africa. UEM was the only Internet Service Provider (ISP) in Mozambique for several years. UEM has also been closely involved with the government in establishing a national ICT policy; university staff were responsible for workshops in every province in Mozambique to explain the draft policy and to get input from local communities. UEM has been at the forefront of Mozambique’s telecenter movement as well.7

Nigeria

The history of Internet in Nigeria is spotty and anecdotal, but two or three Nigerian universities stand out as trailblazers. As early as 1990, McMaster University in Canada helped the University of Ilorin Faculty of Health Sciences obtain email capability. The method was simple, and it worked—twice a week someone from McMaster called the Ilorin Computer Centre to establish voice contact, after which data transfer took place. Thus, the Faculty of Health Sciences was able to send and receive email messages.8 In addition, one of the first broadband email points established in Nigeria was through the Yaba College of Technology in 1993, thus providing users willing to dial in to Yaba with email access.

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6 Christine Kisiedu tells the story of “bringing E-mail to Ghana” in Rowing Upstream: Snapshots of Pioneers of the Information Age in Africa. See http://www.piac.org/rowing_upstream/chapter7/ch7bringing.html. You will find the PADIS story at: http://www.piac.org/rowing_upstream/chapter7/ch7sendaleetter.html.


South Africa

The first “ping,” i.e., the first time a true online Internet connection was established, was in 1992 at Rhodes University. Rhodes University is also noteworthy because it was the first gateway for UNINET, South Africa’s research and academic network, and because it also permitted universities in southern Africa to use the gateway at no cost.9

Tanzania

In Tanzania, the first email system was established at the University of Dar es Salaam Medical College through HealthNet; a second email node was placed on the main campus through the same IDRC-funded project that supported Makerere University’s early email efforts. The university then started to provide email services to the university community, the government, and other users. This was followed by full Internet in 1995.

Uganda

Email had its start in Uganda in 1991, when Makerere University joined a project supported by IDRC to provide FIDONET email capability to university computer centers in five African countries. MUKLANET served email users inside and outside of the university community until other forms of access became available in Uganda.10

Aida Opuku-Mensah, Team Leader, Promoting Information Technology for African Development, UNECA

“Governments are the policy-makers and should create an enabling environment, and the policy makers need to develop an awareness of the importance of ICT. This is not always the case. Universities can help their countries prepare for ICT. They should participate in national policy reviews by conducting policy and bandwidth research.”

Although universities in the Partnership countries have been ICT leaders in many ways, they have not always played roles in the articulation of national ICT planning. Some have, of course, and Mozambique stands out in this regard. Because this is such a critical issue to national development, the place of universities at the “policy-making table” came up for sustained analysis several times during the workshop and is discussed in more detail in the next chapter.

All participants were asked to prepare background material on the status of ICT in their countries, universities and consortia before the meeting.11 The tables below are a consolidation of the information participants provided together with data from the Internet Connectivity Web site maintained by Mike Jensen and the Africa Information Society Initiative (AISI). The sections on the South African Research Network, AAU, and IUCEA are also based on materials participants prepared for the meeting. A selection of these reports will be found on the Partnership Web site. Go to http://www.foundation-partnership.org/ICTworkshop and follow the links. AISI’s home page on national ICT status and planning is located at http://www.unecha.org/aisingi/nici/Default.htm. The Jensen site URL is: http://www2.sn.apc.org/africa/.

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10 See: http://www.piac.org/rowing_upstream/chapter7/ch7muklastory.html for the full story of MUKLA.
11 You will find a list of topics that each university was asked to provide in Appendix Three.
### ICT at the National Level

<table>
<thead>
<tr>
<th>Country</th>
<th>ICT Planning and Capability</th>
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<tr>
<td>Ghana</td>
<td>The government of Ghana is in the process of formulating its national ICT policy and is also drawing up action plans for implementation. There are eight commercial Internet service providers in Ghana, with dial-up service to local telephone numbers in six cities outside of Accra. Users outside of these locations must make a trunk call to Accra for access to the Internet. The University of Ghana is also coordinating a national universities network, which is not yet fully operational. In addition, there are over 150 Internet cafés in the country, approximately 90 percent of them in Accra.</td>
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<td>Mozambique</td>
<td>The government of Mozambique approved a National Information Policy in December 2000. There are about ten commercial ISPs, but only a few of them have national coverage. Those that do, offer local dial-up service in nine cities in addition to Maputo. Eduardo Mondlane University also offers a not-for-profit Internet service, but users must dial in to Maputo. There are numerous Internet cafés, particularly in Maputo, and two telecenters, which serve as community access points.</td>
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<tr>
<td>Namibia</td>
<td>The government of Namibia recently ratified a National ICT policy, which promotes universal access to the Internet and the utilization of ICT. To that end, Telecom Namibia recently introduced a new national dial-up number series, known as “Internet calls,” with a charge of 20 percent less than the normal local tariff. ISPs have made use of this service to extend their connectivity to any point in the country where there is a telephone line. This means that Internet connectivity in Namibia is now nationwide. There are currently four ISPs that offer ISDN connectivity at either 64k or 128k, as well as the more common analogue (56k) connection. One ISP offers broadband connectivity via satellite, making use of the customer’s DSTV (satellite TV) dish and an additional card that connects the satellite decoder to the PC. The University of Namibia was the first institution in Namibia to be connected to the Internet.</td>
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<tr>
<td>Nigeria</td>
<td>Although the government of Nigeria produced a National Policy on Telecommunications in 1998, there is no national ICT policy yet. The National Communications Commission (NCC) has licensed 38 ISPs, but only 12 are active; they provide dial-up services in six cities in addition to Lagos. Of all of the Partnership countries, Nigeria is the most handicapped in terms of its ICT infrastructure, including unreliable telephone lines and electrical power.</td>
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<tr>
<td>South Africa</td>
<td>South Africa is among the top 20 countries in the world when ranked by the number of Internet nodes. The number of users in South Africa is about 30 times larger than Egypt, the next largest African country in terms of Internet. South Africa is also noteworthy because it has full Internet capability throughout the country. There are ten &quot;top level&quot; ISPs with their own leased lines and numerous &quot;second-level&quot; ISPs that rent bandwidth from a &quot;top level&quot; provider. South Africa has dial-up services throughout the country. South Africa also has advanced data service capability-ISDN, GPRS, and Frame Relay. South Africa’s universities are networked through the Tertiary Education Network (TENET).</td>
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12 Perhaps because Mozambique began to develop Internet capacity so early, there are voluminous resources about ICT development in that country. In addition to the sources cited above, the government of Mozambique has mounted its own site on national ICT policy: http://www.infopol.gov.mz/.

13 Namibia is included in this table because two resource people from the University of Namibia attended the meeting.

14 Go to http://www2frd.ac.za/uninet/history for a history of the development from UNINET to TENET.
<table>
<thead>
<tr>
<th>Country</th>
<th>ICT Planning and Capability</th>
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<tr>
<td>Tanzania</td>
<td>Tanzania reformed and deregulated the telecommunications sector in 1993. A number of workshops have been held under the UNECA National Information and Communications Infrastructure (NICI) framework; a draft National ICT Policy for Tanzania was produced in April 2002 and published on the Ministry’s Web site for public comment. Subsequently, in 2003, the policy document was adopted as a government white paper. There are 11 commercial ISPs, including one on Zanzibar island, with dial-up services in Dar es Salaam and major cities. Services are being planned for towns without Internet. The University of Dar es Salaam is also an ISP.</td>
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Uganda | Uganda adopted a Telecommunications Sector Policy in 1996 and passed a Telecommunications Act in 1997. UNDP is supporting work on creating an ICT National Policy. A draft policy has been completed and will be tabled before Cabinet for adoption. There are five major Internet Service Providers in three cities—Kampala, Jinja, and Mbarara. Uganda also has advanced data service capability—ISDN and DSL lines. |

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**Home pages and ICT**

Most of the universities participating in the workshop have home pages, with details on the university, admissions, faculties and departments. Some of them also provide detailed information on ICT strategic planning and implementation. Makerere, Dar es Salaam, and Eduardo Mondlane are three universities that use their Web sites for this purpose.

![Makerere University](http://www.makerere.ac.ug/makict/)

**ICT URLs**

**Makerere University**

http://www.makerere.ac.ug/makict/

**University of Dar es Salaam**

http://www.udsm.ac.tz/ict_udsm/ict_mlimani.html

**Eduardo Mondlane University**

http://www.uem.mz/ictproj/ictsarec/index.htm

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15 See [http://www.moct.go.tz/ict/](http://www.moct.go.tz/ict/), Tanzania’s ICT Task Force Home Page, to read a copy of the draft ICT policy. (Professor Mathew Luhanga, Vice Chancellor of the University of Dar es Salaam and a telecommunications engineer, is chair of the Task Force.)

16 The United Nations Development Program in Kampala maintains an ICT home page, where you can find the draft ICT policy. It is at: [http://www.undp.or.ug/ict.htm](http://www.undp.or.ug/ict.htm).
With the exception of South Africa, ICT implementation in Partnership countries began before strategic plans were written. In most instances, email was the first development, followed by other applications. Of the Partnership universities, Eduardo Mondlane University took the lead, followed soon thereafter by the University of Dar es Salaam. Makerere University learned from the experience of the first two. In turn, the University of Namibia has benefited from Makerere. Informal networks are growing, with one university helping the other. The table below summarizes the ICT status of universities participating in the workshop.

<table>
<thead>
<tr>
<th>University</th>
<th>ICT Status</th>
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<tr>
<td>Bayero University, Nigeria</td>
<td>ICT plans are incorporated into Bayero University’s overall strategic plan. The university established a small Local Area Network (LAN) in 1997/98, with three computers, one of which was used by the entire university to send and receive email. Since then, the university has installed several LANs, and email capacity has improved considerably. The university has two Internet cafés. One has a dial-up connection; the other is connected to the ISP with a wireless link. One café has 56Kbps capacity, the other 64 Kbps. There is some networking on campus, but no campus backbone yet.</td>
</tr>
<tr>
<td>Eduardo Mondlane University, Mozambique</td>
<td>Eduardo Mondlane University adopted its first Information Technology Policy and Master Plan in 1992. In 1998 UEM adopted a strategic plan that recognized ICT as an important tool for all sectors of the university. A second ICT plan was developed in 2000. Although it has not yet been approved officially, it is being used as a working document. UEM has a fiber optics cable in place on the main campus, with radio links to other university locations. There is a VSAT on the main campus, which was due to be upgraded in August to 1Mbps/512 Kbps. There are local area networks in each faculty, but not each department. The cost of the VSAT is about $12,000 a month. By switching to a new provider, UEM will receive more bandwidth at lower cost.</td>
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<tr>
<td>Kwame Nkrumah University of Science and Technology, Ghana</td>
<td>The university has established a number of computer labs in the main library and five other locations. Plans are underway to install a campus backbone, when funding becomes available. In addition, the university is planning to install a VSAT, at a cost of $4,500 a month, for an uplink of 64Kbps and a downlink of 512 Kbps.</td>
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17 Information on ICT at UEM is available on the university’s home page. Go to: http://www.uem.mz/ictproj/ictcarec/index.htm.
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<tr>
<th>University</th>
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<tbody>
<tr>
<td>Makerere University, Uganda18</td>
<td>Makerere University started its ICT strategic planning process only within the last two years, but it has had the benefit of learning from other universities in the region, such as Dar es Salaam and Eduardo Mondlane. Overall, ICT planning has addressed the lack of awareness within the university of the benefits of ICT. The challenge has been to sensitise university administrators and staff to the advantages of using ICT effectively. The university has a 1500/786 Kbps leased Internet Point of Presence (POP) at an annual cost of $270,000, which includes a Value Added Tax of 17 percent, using two different national telecommunications operators. This is currently cheaper than it would be if the university had its own VSAT. The university has a campus backbone, with links to each of the faculties. Not every department has its own network, however.</td>
</tr>
<tr>
<td>Obafemi Awolowo University, Nigeria</td>
<td>The Vice Chancellor and other senior administrators have been involved in all aspects of decision-making pertaining to ICT. The university currently has a VSAT, with a bandwidth of 512Kbps/128Kbps, for which it spends $153,600 annually. Plans are in place to upgrade to a downlink of 1Mbps. There is a campus backbone, mainly wireless, and almost every department is networked. The university teaching hospital, which is outside the main campus, is linked to the network by radio. Faculty housing and the conference center guesthouses are also connected. The university has also put in place eight Internet cafés.</td>
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18 See http://www.makerere.ac.ug for information about ICT at Makerere University.

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**Email at Eduardo Mondlane University**

In a student survey conducted at Eduardo Mondlane University in 2001, approximately 50% of the students reported that they use Internet, primarily for email. Most of them go to the computer lab when they want to send or receive email. The lab currently has four public-access Internet computers, one of which is reserved for lecturers.

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Photo by Luis Neves Cabral, Eduardo Mondlane University
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<tr>
<th>University</th>
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</table>
| University of Dar es Salaam, Tanzania 19 | The University of Dar es Salaam went through a strategic planning process from 1995-96. ICT was an integral part of this process, with leadership coming from the Vice Chancellor, who chaired the ICT Steering Committee. The head of the computer center served as secretary and all deans and directors were represented on the committee.  
There are two international gateways; one is a backup. There is a VSAT on campus with a bandwidth of 512Kbps/1Mbps, at a cost of $9,500 per month. There is also a leased line, which costs $7,800 per month for 256Kbps/512 Kbps bandwidth. The main campus and the two college campuses have fiber optic backbone networks connecting all buildings. One campus is linked to the main campus by an optical fiber link, while another campus is linked by an 11 Mbps wireless link. All departments have local area networks. In addition, the student residence halls on the main campus are linked to the backbone network. |
| University of Ghana, Ghana   | The university computer center oversees implementation of ICT on the campus with the assistance of a steering committee chaired by the Vice Chancellor.  
There is a fiber optics campus backbone, with links to some, but not all, departments. (The library is connected to the backbone.) There is a VSAT in place, with an uplink of 512Kbps and a downlink of 1024 Kbps. The university pays Emperion of Denmark a monthly payment of $10,400 for this service. Ku-band frequency is used. |  
| University of Jos, Nigeria   | ICT at the University of Jos receives considerable support from the university's administration, which is involved in all facets of implementation. Jos has a VSAT, with a connection of 64/128 Kbps, at a cost of $4,332 per month. There is a fiber optics backbone, with some LANs. Because electricity supply is so unreliable, Jos uses solar power as a backup system. |

19 See http://www.udsm.ac.tz for details on ICT at the University of Dar es Salaam.

When the electricity fails... At the University of Jos, the computer room works, even if the electricity goes out: a solar panel, inverters, and a battery system can do the trick when the electricity goes out.

Photos by Len Liverpool
South Africa is not included in this table because South African universities benefit from full connectivity through the Tertiary Education Network (http://www.tenet.ac.za). The origins and birth of TENET are discussed in more detail below.

Because of the size of Nigeria's higher education system, which is comparable to that of South Africa, we asked our Nigerian colleagues to provide a brief overview of Internet capacity for the sector. Among their points were:

- Nigeria has a total of 52 universities—26 federal, 19 state, and seven private universities. There are also four autonomous inter-university centers.
- Thirty-eight of the 52 universities have registered Internet domain names, but only nine of them have real-time full Internet connectivity—eight of them via VSAT.

**University** | **ICT Status**
---|---
University of Namibia, Namibia | The University of Namibia began its strategic planning process in October 2001, and found Makerere University's guidelines helpful. The University of Namibia Windhoek campus uses two ISPs—one for Internet, with a 384k leased line, and the other for email, with a 64k leased line. Everything is routed through the Windhoek telephone exchange. The university's other centers have 64k leased lines to the telephone exchange closest to them; data is then routed through the Windhoek main campus (via the Windhoek exchange). The university also has an extensive video conference network for its Windhoek, Neudamm, Oshakati, and Ogongo campuses. UNAM does not yet have an ICT strategic plan, but a draft policy is now ready for consideration by the University Senate. There are already guidelines for the purchase of hardware, software, and the use of the computer center.

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**Repairing computers at Bayero University**

In-house technical staff routinely handle hard disk problems, malfunctioning cards, faulty monitors, power-related problems, and viruses. All repairs are entered into a log book for future analysis. Although the university does not yet formally involve students in repairs, interested students sometimes find their way to the lab to help out.

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Photo by Ality Photo Prof
The federal universities at Ife, Jos, Sokoto, Benin, Calabar, Uyo, Abeokuta, and Nsukka have VSATs. The Pan-African University, a private university in Lagos, has a radio link to a local ISP and a LAN on its Lagos Business School campus.

Cost data for bandwidth is presently available for four of the eight universities with VSATs (Ife, Jos, Nsukka, and Sokoto). It ranges from $16-$23 per Kbps per month.

Bandwidth availability is highest at Obafemi Owolowo University in Ife (with 512 Kbps on the down link and 128 Kbps on the uplink) and lowest for Nsukka and Benin, both of which have 128 Kbps on the downlink and 64 Kbps on the uplink.

The South African Research Network

The development of academic networking in South Africa was not without its vicissitudes. During the period from 1985-1987, a few individual universities, most notably Rhodes, began to experiment with dial-up email and networking on a limited basis. Rhodes University also helped other universities in southern Africa, such as Eduardo Mondlane University and the University of Malawi, to go online by serving as their Internet gateway.

In 1987 South Africa's Foundation for Research and Development (FRD) provided the initial seed money and infrastructure to establish a research and academic network called UNINET. UNINET served the country's tertiary sector until its responsibilities were taken over by the Tertiary Education NETwork (TENET) in 2001.

### Landmarks in South African academic networking

- **Pre-1987:** Some, but not all, universities have dial up connections to the Internet.
- **1987:** The Foundation for Research and Development (FRD) provides seed money to establish UNINET.
- **1989-1999:** UNINET establishes dial-up services for South African and other universities in the region.
- **1991:** UNINET establishes South Africa's first TCP/IP link to the Internet.
- **2001:** UNINET closes on 31 January, and TENET takes over.

UNINET was run as a cooperative effort among South Africa's higher education institutions (both universities and technikons), without direct government funding. The FRD contributed 10 percent of its budget, and UNINET members put in the remainder. Throughout its existence, inadequate funding to buy sufficient bandwidth hampered UNINET's ability to provide services. This was exacerbated by the lack of support from Telkom, South Africa's telecommunication's giant.

### Principles of TENET

- TENET is owned by the higher education sector and is a non-profit company.
- TENET acts as an agent for the higher education sector by negotiating a single set of pricing packages and collecting the money to pay Telkom.
- Bandwidth costs have gone down by one third since the establishment of TENET.

The planning process for creating TENET built on UNINET's strengths and learned from its weaknesses. Vice chancellors, senior academic administrators, including librarians, assumed ownership of the TENET concept from the outset.
Donors assisted grantee universities in establishing a strong and knowledgeable team to negotiate better rates with Telkom. The universities explained to Telkom that they stood the risk of losing further donor funding if bandwidth did not improve because the donors would only provide bandwidth-intensive resources if they could be used. Through the university consortium’s education of Telkom, Telkom came to understand that favorable treatment for higher education was in the country’s best interest and that it would not lose money in the arrangement. Bandwidth costs would come down, but the amount of bandwidth purchased would increase. Telkom’s profit margin was therefore not adversely affected by the new arrangement. Thus, although the negotiations required a considerable time investment, Telkom and the universities now have a good working relationship.

Association of African Universities

The AAU is a pan-African organization that was founded in 1967 and is located in Accra. It promotes cooperation between universities in Africa and between African universities and the international academic community. More than 100 universities belong to the AAU.20

The AAU has recognized the importance of ICT to education for many years and has carried out the following ICT activities:

- Collaboration with the American Association for the Advancement of Science (AAAS) in the organization of a workshop on Electronic Networking for West African Universities in December 1993.21
- Implementation of email capacity in the office of African university vice chancellors in 1996. The goal was to provide training and connectivity to universities without their own connections to email.
- Creation and implementation of DATAD.
- Organization of a technical meeting of experts at the University of Dar es Salaam in the year 2000.
- Inclusion of ICT in the AAU Core Program at the Tenth General Conference in January 2001.

Inter-University Council of East Africa

The IUCEA was established in 1970 with the mandate of fostering higher education within the East African Community (EAC). Its activities were adversely affected, however, following the collapse of the EAC in the late seventies. IUCEA was revitalized in 1998; it works with institutions of higher learning in Kenya, Tanzania, and Uganda, and is located in Kampala.23

The process of recreating IUCEA included a thorough analysis of its ICT requirements and those of its members. As a first step, IUCEA carried out an internal ICT needs assessment, which resulted in creating a local area network, establishing a viable email system, and creating a home page. Having met its technology needs, IUCEA began to examine the needs of its member universities. It carried out a pilot survey between December 2001 and February 2002 at selected universities to assess their ICT infrastructure and future requirements. Two universities in each member country—

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20 More information on the AAU will be found on its Web site: http://www.aau.org/.
21 A print copy of the workshop report is available free of charge from AAAS. Email africa@aaas.org for a copy. (It is not online.)
22 Both reports will be found on the AAU Web site. Go to: http://www.aau.org/english/documents/
23 More information on the IUCEA will be found on its Web site: http://www.iucea.org/
try—Kenya, Tanzania, and Uganda—were selected. IUCEA expects to continue and to expand upon this work.

Database of African Theses and Dissertations (DATAD)

DATAD is an AAU “core program.” Established in 2000, DATAD is a management and dissemination tool for theses and dissertations completed in African universities. There are currently 11 participating universities; more will be added in phase two of the project. Each DATAD record contains a complete citation, including a full abstract, keywords, and local terms. Over 12,000 records have been entered thus far. DATAD is unique—it is African and the records are more detailed than any other bibliographic database of theses and dissertations. DATAD is available online and on CD-ROM for African universities in slow bandwidth countries. You will find more information on DATAD on the AAU home page. See http://www.aau.org/datad/.

Search Results

Searched DATAD for: higher education+gender

<table>
<thead>
<tr>
<th>Author</th>
<th>Title</th>
<th>Degree</th>
<th>University and Department</th>
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<tr>
<td>Walugembe, David</td>
<td>Gender Differences in Perceived Stress and Coping Strategies Among Higher Education Students in Ethiopia</td>
<td>Master of Arts in Educational Psychology 1997</td>
<td>Addis Ababa University, Educational Psychology</td>
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<tr>
<td>Namuhanga, Rebecca</td>
<td>Gender balance at departmental leadership levels of administration in institutions of higher learning in Uganda</td>
<td>M.A. (Educ. Mgt.) 2000</td>
<td>Makerere University, School of Education</td>
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Database of African Theses and Dissertations (DATAD)
ICT-enabled learning is not about technology *per se*; moving from “talk n’chalk” to innovative use of technology requires a new approach to teaching and learning, both in a residential setting and for distance education (DE). In his paper and presentation, Tobie de Coning focused on lessons learned at the University of Stellenbosch on appropriate use of ICT for distance education.

The University of Stellenbosch established an E-learning program in 1997. Of the university's 24,000 students, 7,000 of them are enrolled in distance education programs. They never come to campus. All distance education at Stellenbosch is ICT enabled, but it is a mixed mode that uses more than one technological platform. Although interactive video is the main method of course delivery, CD-ROM and the Internet are also used. In addition, students without access to adequate ICT facilities can receive their materials in print form.

The university has decided that ICT should form the basis of both residential and off-campus programs. This decision was driven by two considerations. A well-educated citizenry, familiar with ICT, is essential if South Africa is to meet the challenges of the 21st century. Together with this, universities from abroad were entering the higher education market in South Africa with ICT-intensive program, and eroding the dominant position of the country’s own universities and technikons. If students wanted "technology-enabled programs," the University of Stellenbosch wanted to provide them. Thus, all academic programs began to use technology. The university's economics course, for example, now has only seven contact sessions (down from 20). The rest is student centered and relies on ICT. Thus, for the University of Stellenbosch, the distributed learning paradigm is no longer about physical distance. Distributed learning applies to both residential and distance; ICT is the glue that binds them together.

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**Beware of becoming irrelevant tinkerers with technology**

"Embarking on ICT-mediated education is...an inherently risky affair. It can be doomed if it is perceived and implemented as traditional residential education which is technologically mediated...Institutions must guard against becoming so enthralled by technology that sight is lost that technology must be easily accessible and affordable to the various target audiences. This is a crucial consideration, especially in the context of Africa where the socio-economic circumstances of the majority of the population are such that inappropriate technology can exclude them from higher education."

TJ de Coning, *Embarking on ICT-Enabled Learning: Lessons Learnt*
Developing ICT-enabled course modules was not without its vicissitudes. As is the case everywhere, not every lecturer was equally enthusiastic. The university therefore decided to provide both "intrinsic and extrinsic awards," within a context of rigorous evaluation. It put up seed capital for which academic departments can apply for program planning and development. Applications are judged in part on whether they are needs-driven and whether they are aligned with the mission and vision of the university. In addition, every program is assessed for financial viability. Staff receive help in using the technology, curriculum development, and evaluation. All content is owned by those who create it; there is a complicated formula for how profits are shared, which is found in the university's intellectual policy statement. When E-learning began in 1997, there were only two programs. Now all of Stellenbosch's faculties are involved.

<table>
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<tr>
<th>What about other universities?</th>
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<tr>
<td>The experience of Dar es Salaam</td>
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</table>

- A feasibility study is carried out for each program interested in creating E-learning modules.
- Academics receive payment for their work—for program development, for creation of content, and for evaluation. This payment is in addition to their salaries.
- UDSM provides the capital costs, which must be repaid from any profits.
- The university’s Office for Intellectual Capital is responsible for policy development and implementation. Academics working on E-learning activities receive a contract from UDSM.

The Stellenbosch experience with distributed learning can be summarized as follows:

- Innovative and effective use of ICT requires a different approach to teaching and learning. Even so, it is not wise to wait until new course methodology is entirely in place because competition for students and tuition fees is fierce. Learning by doing should be considered a strategy.
- DE students are not the same as residential students; distance education requires a different approach to the teaching and learning paradigm and sensitivity to the context in which DE students live.
- Institutional red tape is the bane of every student’s life. DE students are not on campus; yet they need to handle administrative affairs easily and efficiently. A one-stop service portal can reduce red-tape induced frustration.
- Adopt an integrated approach to the development of ICT-mediated courses in order to ensure standardization, appropriate training, and appropriate use of funds.
- Although collaborating with private providers of distance education may seem like a good idea, there are pitfalls attached to these joint ventures, particularly when the philosophy and mission of your institution are not in accord with those of the private vendor.
- Look for your comparative advantage rather than attempting to be all things to all people. "…Strategic logic dictates a niche approach as a means to sustainable strategic positioning, according to which specific target audiences are carefully selected…"
- It is essential to establish which activities are necessary for your institution's ICT-mediated program, which ones are important, but not critical, which ones can safely be eliminated from consideration, and which ones should be added to enhance effectiveness. This "value-added chain" is a key instrument in strategic planning.
- The dynamic of effective ICT utilization requires an awareness of global forces in the development of both content and technology. It also necessitates the need to establish a central unit.

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which is responsible for working with the institution as a whole, with faculties and departments, and with individual staff members.

- Faculties, departments, and staff adopt ICT-mediated learning at different speeds. "Success breeds success." Skeptics can be won over if they see their colleagues using ICT effectively.
- The application of ICT in the teaching and learning paradigm is appropriate for both residential and distance learning. Moreover, the definition of residential education will change as teaching and learning become virtual rather than classroom driven.

ICT-Enabled Learning
Pilot Projects at African Universities

**The view from the United States**

"...ironically, at the most knowledge-based entities of all—our colleges and universities—the pace of transformation has been relatively modest in key areas. Although research has in many ways been transformed by information technology, and it is increasingly used for student and faculty communication, other higher-education functions have remained more or less unchanged. Teaching for example, largely continues to follow a classroom-centered seat-based paradigm."  

Several of the universities represented at the workshop are beginning to apply ICT for teaching and learning. This is the most complicated piece of the puzzle, for, as the Stellenbosch experience makes clear, it isn’t about “tinkering with technology.” It requires a new way of thinking about what constitutes education. As Derek Keats of the University of the Western Cape said in his presentation, the goal is to move from an instructivist paradigm, “the sage on stage,” to a learning-centered approach. Moreover, as the National Research Council (NRC) report makes clear, this is proving to be as difficult in the United States as it is on the continent.

Four presentations at the workshop focused on different aspects of ICT-enabled learning. The University of the Western Cape is pioneering the use of cutting edge software. The University of Namibia (UNAM) is collaborating with Walden University in the United States to train its staff on how to use technology appropriately. UNAM is also using video conferencing to reach satellite campuses and communities far from its main campus in Windhoek. Finally, Tufts University is collaborating with the University of Dar es Salaam and Makerere University to develop and teach a module in international relations.

**University of the Western Cape**

The University of the Western Cape (UWC) was established in 1960 as a college for “coloured students.” In 1972 the university declared itself “non-racial,” and in 1983 it gained independence from direct political control. During the apartheid era UWC was doubly penalized: first because non-white universities routinely received proportionally less funding than did white institutions; and secondly because UWC was at the forefront of the liberation struggle, it was therefore a thorn in the side of the government. Today UWC considers itself in the vanguard within another context—using technology to transform pedagogy.

UWC is grappling with ICT development from two perspectives—experiments with open source software and with open content development. These activities are being undertaken within the context of ICT strategic planning, the university’s Teaching and Learning Technology Unit, and a new program...
center in the computer sciences department. This center is responsible for a range of technology research initiatives, including projects that bring cutting-edge technologies to bear on teaching and learning...  

The university's first attempts to use the Internet for teaching and learning took place in 1995 when undergraduate students were provided with a computer room and 25 computers to access course materials on the botany Web server. In 1997 these materials and other Web content were linked together to create an integral learning package. The Internet Biology Education Project started at this time, and included the development of an online biology textbook and an "ecology tree." Other units within UWC using ICT intensively to date include the Faculty of Law and an Intercontinental Masters in Adult Learning and Global Change. This latter course was developed in collaboration with universities in Sweden, Canada, and Australia.

KEWL has many of the same features as do commercial courseware packages, but it is free and continues to evolve. You must register to receive a log-in name and password. After logging in, the KEWL introduction links you to numerous options including access to courses. Some instructors, such as those in the conservation evaluation course shown below, make more active use of KEWL than do others.

Open-source courseware at UWC

KEWL URL

Go to: http://kewl.uwc.ac.za/

29 Derek Keats' paper for the Addis workshop, "Posed for Takeoff: using ICT to transform teaching and learning at the University of the Western Cape," page 7.

30 Go to: http://www.botany.uwc.ac.za/sci_ed. A full list of relevant Web sites at UWC will be found in Keats' paper.
Most of the universities participating in the Addis workshop are using proprietary course development sourceware, such as Blackboard or WebCT. UWC, however, is developing an open-source software package called KEWL (Knowledge Environment for Web-based Learning). KEWL is a learning management system that contains many of the features of its commercial cousins, but it was developed with ease of use in mind and it is free. In addition, commercial packages are frequently US centric; KEWL was developed with African university requirements and conditions in mind. In the process, KEWL is also providing IT students with training opportunities and giving them the ability to develop cutting-edge technologies. Students thus hone their research skills in computer sciences, information systems, and related disciplines and simultaneously make a contribution to society. (They also learn the more mundane tasks of repairing, upgrading, and rebuilding computers.)

Established in 1992, the University of Namibia has four campuses and nine centers spread across the country. (See map on the left.) One is located in the north-central region, where about 46 percent of the population lives.

Inaugurated in 1998, the northern campus at Oshakati was created to provide educational opportunities for students in this region, which is still relatively disadvantaged compared to the rest of Namibia, foster economic development, and encourage community participation. Community involvement is ensured through the work of the Northern Campus Advisory Council, a community committee that is responsible for guiding the development of the whole campus. In addition, annual meetings to review progress bring together local people, university staff, and invited guests.

Lacking the resources to duplicate teaching staff, UNAM needed to find an effective way to offer courses to students on the Northern Campus. The solution was interactive video. UNAM took advantage of the country’s good telecommunications infrastructure by purchasing and installing state-of-the-art video equipment on both the Windhoek and northern campus. Lecturers on the Windhoek campus can now teach students on both campuses simultaneously; the 800-kilometer distance between campuses is no longer an issue.

Since the establishment of interactive video on the northern campus, UNAM has installed systems elsewhere, including the Faculty of Agriculture and Natural Resources campus in Ogongo, which is 50 kilometers from Oshakati and where crop sciences are taught. Teaching staff are able to remain on the campus where they work—either Neudamm or Ogongo—and provide instruction to the other campuses.

Although use of video conferencing has permitted the university to overcome many problems, pedagogical problems remain, and they are similar to those experienced elsewhere—establishing quality control methodologies, promoting "best practices," moving teachers away from reliance on lectur-
ing, etc. In addition, use of video has created a new set of headaches for UNAM: the university experiences ISDN errors; costs are very high ($2,800 a month plus maintenance); and bridging must be done via South Africa. UNAM is now investigating the possibility of moving from ISDN to IP, which would make the broadband connection for voice, data, and video more cost effective.

Because 60 percent of UNAM's students take courses by distance education, faculty needed a new set of skills to teach effectively in this environment. The UNAM-Walden University partnership was born out of this need. Negotiations and planning lasted about a year; the first project, a course called Teaching in the Online Environment, took place in 2001.

**UNAM/Walden partnership principles**

- Missions of the partners complement one another.
- Projects correspond with the nature and substance of the partners.
- Projects further positive social change.
- Projects capitalize on the respective and complementary strengths of the partners.
- All partners benefit.

Facilitated by Walden University in the United States, the course was taught entirely online using Blackboard and lasted for twelve weeks. Seventeen staff from UNAM and the Namibia Polytechnic participated, but there was a fifty percent drop out rate because bandwidth problems resulted in frustratingly slow upload and download times. Course developers used ten measurable outcomes to measure success, ranging from demonstrating an understanding of basic elements of online courses to cognizance of emerging developments affecting online education.

An evaluation was conducted after the course. A large number of students found the technology overwhelming, especially those who were not familiar with the Internet. The terminology used by Walden as well as the course materials were very US-centric; in the future course content should have more African input. In addition, as indicated above, efforts were often frustrated by low bandwidth. Finally, some students were unwilling to comment online about the work of other people, which hampered true interactivity.

UNAM now hopes to work with Walden University on creating its own online training course, which would take into consideration the problems encountered in the first phase. Insufficient funds, however, are hampering UNAM's efforts.

**Curriculum co-development with African universities**

**CCD in a nutshell**

CCD bridges the barriers of distance and improves the quality of education in each home site. Knowledge receivers are also knowledge senders and vice-versa. The primary instructor is on the ground with the students. The Web site is used to enhance teaching.
The curriculum co-development (CCD) project got its start in January 2001 when Tufts University, the University of Dar es Salaam, and Makerere University began to collaborate in the development of a metacourse organized around the theme of "Regionalism in Africa." Using Blackboard software as a platform, the universities interacted through two Web sites that connected their respective courses: Regionalism in African International Relations (Tufts), Regional Integration (UDSM), and International Relations (Makerere). The goals were to use the technology to rethink the pedagogy of international studies and to enhance the capacity to create new knowledge.

The project was hampered by large class size and poor infrastructure on the African campuses. At Makerere University, only 25 political science students were able to participate out of a total number of 3,000 students taking the course because there were so few computers in the faculty, and even those 25 students were confronted with problems resulting from broken computers. The university tried to compensate by a liberal computer lab access policy—it was open six days a week and until 10:00 pm, Monday-Friday.

Nevertheless, in spite of these problems, enthusiasm was infectious, and other lecturers realized the potential of using CCD techniques. Gabriel Jagwe-Wadda, a sociology instructor, created an E-learning site for his Population and Society class, for which 107 students registered. It was very simple: Word files, links to relevant Web sites, narrative texts, etc. There were no graphic images, no video, and no multimedia. His site had over 36,000 hits over the course of the semester.
Perhaps the splashiest achievement of the year was a virtual chat with Jendayi Frazer, President Bush’s White House Advisor for Africa. It resulted from two African foreign policy debates on the UDSM and Makerere sites: one on collective security structures and one on the war against global terrorism.

Technical difficulties notwithstanding, the experiment has been a valuable learning experience and a success. Collaboration among all three institutions strengthened teaching and learning. Students and lecturers alike thought that they had learned valuable lessons in communication and critical thinking and analysis.

Who benefits? The copyright dilemma

Copyright came up on numerous occasions during our discussions about the preparation and utilization of online materials. Does anyone own these course materials? If so, who? Who receives any profits that accrue to selling them? How can intellectual property rights be protected if they are placed on the Web? These intellectual property rights (IPR) difficulties are exacerbated by the fact that national IPR policies for electronic media do not exist uniformly across the continent; nor are there equivalent regulatory frameworks in place. This makes cooperation within Africa difficult and places African universities at a disadvantage when they establish "partnerships" with northern universities, for universities outside of Africa typically have well developed policies and offices to protect intellectual property rights.

Two approaches were brought to the table. The first is that these teaching materials are subject to copyright, in the same way that a textbook is protected. At Stellenbosch and Dar es Salaam, the university IPR office is responsible for multimedia materials. Formal contracts ensure that ownership and payment are agreed to in advance. But many universities do not have offices to deal with copyright. One way to deal with this problem is to restrict access to the sites to students registered for the course.

The University of the Western Cape is taking a different tack. UWC promotes the use of open source software and is a signatory to the Open Content Agreement on free and fair sharing of information, with attribution, of course.

Working with what we have

Small solutions make a difference too.

“Sometimes we look for big solutions when small ones are in our grasp. In 1993 at Eduardo Mondlane University, we started an Internet-type thing, which was within our mandate. We had a 1,200 bps modem and a 286 computer. After three months we had 300 people connected to our system, using one telephone line. Our success was so great that we managed to push other developments in the country. One year later we had a 9.6 bps leased line. Those small pieces brought us attention. We should act on three levels: small, medium, and large. If we do well with the small things, we will be able to validate our mandate outside the universities.”

Venancio Massingue, Vice Rector, Eduardo Mondlane University

31 See http://www.opencontent.org/ for more information on Open Content principles.
The vision is to develop the capacity to create African-centric materials and to enhance collaboration among African institutions. But what can we do with what we have? This question gave rise to a rich discussion, replete with examples:

- In the first year of the CCD project at Makerere University, there was only one computer in the library for 25 students. This sorry circumstance didn’t stop the students. They went to the Internet café and paid heavily to log on. Now there is a full computer lab, which is open six days a week. Excitement is so great that the Dean is trying to raise funds to build a larger lab.
- The University of Jos doesn’t have sufficient textbooks, but it has a fiber optic network with an Intranet. Staff have downloaded material from the Internet and put it on the Intranet. They are also trying to digitize course materials.
- The University of Dar es Salaam needed to find a way to provide teaching staff with computers. UDSM purchased 300 PCs at a low cost and lent lecturers the money to buy them. The loans are repayable in 6-12 months.

### Criteria for evaluating and selecting electronic media

Working from the specific examples and projects that participants described, what are overall criteria for selecting software, whether it is courseware or library materials? This session was organized to take advantage of the experience gathered around the table to outline a criteria checklist.

#### Computer-assisted course development software

First of all, take into consideration the computers your users have available to them. Ask the following questions: What kind of hard disk capacity, RAM, and processor speed do they have? Do they have multimedia capacity? In addition, think about your server hardware. Is it sufficient to meet the needs of the software that will be installed on it?

Criteria for selecting software include the following considerations:

- Does the software package have good training materials? Is there a good manual for teachers who want to develop an online course?
- Content is only a small portion of learning; if content were everything then textbooks would be courses. It is essential to ask whether there are sufficient tools available in addition to content—flexible discussion forums, other interactive facilities, ability for students to work in groups, communication tools, and worksheets. Can you manage essays and other assignments online, etc.? Is the package suitable for the development of pragmatic learning/teaching strategies?
- If you are purchasing a commercial package, what are the licensing arrangements?
- Does the software permit importing and exporting files and data?
- Does the package come with an HTML editor?
• Are there "cultural quirks," as was discovered at UNAM?
• Does the package also have student management systems?

Online Courses

Ahmed Bawa, Program Officer, The Ford Foundation

"Quality, human resources, and rewards are critically important components to distance education. As long as DE is at the edge of the university’s perspective, people don’t get involved. Quality must rest in the hands of the departments in the same way that it does for residential courses. African universities have a tremendous opportunity. Every university in the world wants to offer African studies, African political systems, traditional systems, and African languages. Who is better able to do this than we?"

• The determination of quality rests with the lecturer choosing or building his/her course.
• It is not necessary to reinvent the wheel. An appropriate online course may have been developed elsewhere. The Open University in the UK and the Indira Gandhi National Open University were given as examples of institutions with good DE courses.32
• Producing courses is expensive, but can we establish consortial arrangements and take advantage of expertise at different institutions?

Selecting e-journals

Librarians have considerable expertise in selecting books and journals in print form, but are now confronted with the need to choose electronic media. It is no longer as simple as it used to be. Even the terms have changed, and a glossary of arcane terms that was distributed at the meeting will be found in Appendix Five.

At the University of the Western Cape, where Ellen Tise is University Librarian, there is an electronic resources committee in the library that meets monthly. It organizes trials of electronic resources, during which users complete evaluation forms. Based on costs and user feedback the library then makes subscription decisions. Tise believes that this process is important. As she said during the meeting: “An enormous amount of information is becoming available electronically. We need to change library processes in terms of our functions. We need to examine staff roles. In some cases, someone is appointed to manage electronic resources. Some librarians have not been able to manage the change properly.”

But decision-making can be complicated by the fact that many libraries receive free subscriptions and may not want to look their virtual gift horse in the mouth at the outset, but there’s no such thing as a “free lunch” and when donations end, subscription costs can mount up. The Coalition of South African Libraries (COSALC) has established detailed selection criteria, which are found in Appendix Six.

Major evaluation criteria that the group discussed are summarized below:

• Is the content suitable to program needs? Selection committees are important; they need to involve all stakeholders.
• Even if the initial subscription is free, there will still be costs involved. What are they? What are the licensing arrangements?

32 See http://www.ignou.edu and to http://www.open.ac.uk for more information about these universities.
• Journals need to be archived on site or on a remote computer. What are the arrangements for backfiles, particularly if you cancel your subscription?
• Does the package come with access to the most current issue? How quickly are new issues made available?
• Is the journal mounted electronically exactly as it appears in print, or are there links to other relevant databases?

Working assumptions and small groups

**Testing assumptions**

“I want to test a couple of assumptions with you. If this meeting is about the effective use of ICT, we need a verb. Is it about advancing, using this technology, or transforming? Why do we use these technologies? Why will we continue working together?”

Katharine Pearson, Representative, The Ford Foundation Office for Eastern Africa

We broke into groups several times, choosing topics that developed organically from presentations and discussion during plenary sessions. The small groups helped us hone in on what we considered important. On the second day, we teased out recurring themes and tested our assumptions on the importance of ICT and possible strategies. On the last day, we drew conclusions on the way forward. Because several topics were discussed several times during these sessions, this section is grouped by theme rather than chronologically. The sections on policy and bandwidth are far longer than the other small groups because we devoted so much attention to these overarching issues during the meeting—both in plenary and in breakout groups.

The group deliberated and agreed upon four assumptions:33

• Participants wanted to continue working together.
• Participants represented a fount of expertise for further work on ICT at African universities.
• Time and energy are required if the group is going to continue networking.
• The Partnership is only one possible support mechanism for program activities.

We then put potential goals to the test and concluded that the goal is to advance, enhance, and transform institutions through the use of ICT.

Having reached consensus on goals, participants selected seven topics on which to work in depth in small groups. Each group was given the task of emerging with a possible action plan, once again taking into account that each participant would have to find support from funders, not necessarily the Partnership.

The group chose the topics below for consideration:

• Policy
• Bandwidth
• E-Learning
• Libraries

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33 Peter Bateman made a Powerpoint presentation during this session, which is included in the online version of this report on the Partnership Web site. This presentation represents the totality of what the group discussed, but is not reflective of Partnership funding decisions.
Four crosscutting issues were identified as relevant to each of the groups: government support, sustainability, the knowledge gap, and gender. We also recognized that libraries impact almost everywhere: on bandwidth, on the availability of research information, on training, etc. Libraries are sometimes left out of the discussion, but they should be at the forefront of ICT decision-making because of their importance to teaching, learning, and research.

Making a place at the table: The role of universities in ICT policy setting

<table>
<thead>
<tr>
<th>Where do African universities fit into the ICT scheme of things?</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;To what extent will universities become the research and development wings of society? Heretofore universities have been users of ICT. Can they also become producers? We need to think seriously about repositioning universities within the information society. At international conferences we hear that universities are too poor; they don’t have the expertise. We have departments of computer science and information science. What are they doing?&quot;</td>
</tr>
<tr>
<td>Aida Opoku-Mensah</td>
</tr>
</tbody>
</table>

The extent of university involvement in national-level policy-making runs the gamut—from Eduardo Mondlane University and Makerere University, which have been heavily involved in drafting their respective country's ICT national policies, to Nigeria, where government sets policy without input from the educational sector. We realized that this is a tricky topic; participants did not represent their universities, their countries, or their regions. They could speak only from their individual experiences.

Nevertheless, the group emerged with a set of common and practical principles:

- Universities should put their own houses in order. Many universities begin to implement ICT without a policy. Universities should be encouraged to develop ICT policies, learning from the experience of others. They would then be better placed to attempt to influence their governments on national ICT policies and regulation.
- ICT champions should make use of structures that already exist—the vice chancellor's forum or library associations, for example.
- Universities are not always good at marketing themselves or ICT. They need to promote the visibility of ICT wherever possible. The UDSM library exhibit at the Tanzania Trade Fair was visible and successful; the presidents of Tanzania and Zanzibar both visited.
- Make use of regional organizations, such as NEPAD, bearing in mind the limitations attached to each of them.
- Most governments engage in stakeholder activities. How can universities capitalize on these investments? Makerere University, for instance, considers itself as a national resource; it is interested in ICT from the perspective of both the university and of civil society. Telemedicine, which is being implemented at Makerere, demands an adequate ICT infrastructure and is an example of the juxtaposition between the skills of professionals and service to the community. In
South Africa, TENET was able to convince Telkom to give universities preferential rates because they were able to demonstrate that higher education served national needs.

- Universities should develop ICT research capacity in order to have an impact on policy formulation.

The policy group determined as its objective: fostering an enabling environment for the development of ICT policy within higher education institutions in Africa. Policy was attacked from a number of different angles—why, how, crosscutting issues, and information sharing. Information sharing actually came up in every small-group session.

Why are ICT policies important?

- They create an enabling environment for implementation.
- They are required for optimal transformation
- They enable the long-term viability and sustainability of ICT use.
- They raise awareness of ICT use in the institution.

What are the implementation issues?

- Strategic and operational plans are cyclical and should be considered an ongoing process.
- Setting realistic priorities is important.
- ICT policies should be linked to other policies and strategies within the institution, including a change management strategy.
- Mobilizing sufficient human and financial resources is imperative.
- Piloting draft policies in advance of final implementation might help bring about consensus.
- It is essential to have top management actively involved as ICT champions. But establishing an ICT policy should not rely on a top-down approach. If all stakeholders are involved, they will feel a sense of ownership.

The policy breakout group dealt with cross-cutting issues at greater length than other sessions. The group's observations are as relevant for policy as for other issues.

Gender

Nancy Hafkin, Gender Issues in ICT Policies in Developing Countries: An Overview

“Engendering ICT policy is an area of great importance, perhaps the most important in securing the benefits of the information age for girls and women. If gender issues are not articulated in ICT policy, it is unlikely that girls and women will reap the benefits of the information age. Decades of experience have shown that without explicit attention to gender in policy, gender issues are not considered in implementation. Despite the views of many...policy makers that a well thought out policy benefits all, there is no such thing as a gender blind or gender-neutral ICT policy.”

ICT has a differential impact on men and women. Girls traditionally are not encouraged to use computers for anything more than word processing. Universities should be sensitive to the needs of female students and ensure equitable use and access for all students. Key points include the following:

34 This paper was given at an experts meeting of the UN Division for the Advancement of Women in Seoul, Korea, November 2002. The paper will be found on the DAW home page at: http://www.un.org/womenwatch/daw/egm/ict2002/reports/Paper-NHafkin.PDF.
• IT policy should be informed by institutional gender policy.
• IT policy should include all stakeholders.
• IT policy should reflect institutional gender goals, which are meant to redress imbalances. When possible go beyond the expectations of institutional policies.

Sustainability

• ICT resource allocations should be included as part of institutional and departmental budgeting, i.e., as part of the overall strategic plan.
• Deliberate and sustained approaches to staff development should be taken. This includes designing strategies for retention of ICT staff, and for knowing that those who leave must be replaced. Offering ICT training opportunities is one strategy.
• Resources must be made available for innovative experiments in curriculum development—with special effort to build the capacity of staff to be creative in this regard.
• Donor funding for ICT should be in accord with an institution's ability to implement, manage, and sustain these activities.35
• Investigate generating ICT income, but recognize the risks inherent in commercializing services to the detriment of your user base. In addition, charging for services implies that the customer will receive satisfaction; you should not require students to pay for email or computers if systems don’t function properly.
• Engage in multi-year budgeting.
• Make a clear distinction between internal budgeting requirements and external project funding.

Information-sharing

• Several institutions have ICT policies and plans in place, which can be shared among African universities just beginning to carry out ICT planning and implementation. The ICT strategic plans of Eduardo Mondlane, Makerere, and Dar es Salaam are available on their Web sites.
• Networking is important, both face-to-face and virtual.
• Building an effective ICT infrastructure does not happen overnight. It is important to share the process as well as the final product.

Bandwidth

How much is enough?

The universities at the workshop spend about $4,500 a month to $12,000 on bandwidth, depending on the amount purchased. In general, bandwidth rates are usually ten times higher in Africa than they are in North America and Europe. At the workshop, we asked ourselves what could be done to bring down bandwidth costs and whether establishing national or regional consortia to aggregate bandwidth would be an effective strategy.

Increasing bandwidth across an institution can have a ripple effect. The administration must ensure that the infrastructure is capable of handling it, that sufficient well-trained managers are in place to maintain and troubleshoot the systems, and that appropriate mechanisms are in place to plan for utilization—within the library, for administration, for research, etc. We therefore also addressed training and management in conjunction with cost. The group came up with a set of

35 See “Rebooting: Recommendations for the Future” in Rowing Upstream for a list of ICT recommendations aimed at donors and grantee organizations.
working hypotheses and questions for attention by a bandwidth task force:\textsuperscript{36}

- It is difficult to calculate bandwidth needs because limited resources or inadequate infrastructure result in limited use. Furthermore, experience in South Africa is that as additional bandwidth becomes available, the rate of user uptake increases rapidly. Whether the bandwidth is put to good use or not is another matter.
- Conditions across countries and between institutions vary. In some countries the telecommunications system has been deregulated. In other countries, it is still a government monopoly. Most institutions participating in the meeting are using VSATs for Internet. At Makerere University, however, the university does not use a VSAT because it is not cost-effective. Deregulation has lowered costs considerably—from $20,000 a month for 512Kbps to $3,500 a month. One-stop solutions for bandwidth are not a solution without appropriate research.
- The universities buying bandwidth for their VSATS are using middlemen and know they are paying too much. Research on the economics and marketing of bandwidth is called for, as is research on the regulatory environment.
- Excess bandwidth capacity exists in satellites and fiber optic cables. The potential of creating consortia to purchase bandwidth at wholesale prices should be explored. This calls for collaboration between universities and regional bodies.
- What can be learned from case studies of the South African experience or that of other countries in the developing world? Chile, for example, has been a leader in the introduction of the Internet in South America since the first Web server was set up at the University of Chile in 1993.\textsuperscript{37}

**E-Learning**

An E-Learning group should include someone familiar with content development, a librarian, regional representation, organizational experience, and marketing know-how. Experience with E-Learning would be a plus, but interested novices would also be welcome.

E-Learning efforts are to be grouped around the following themes:

- Increasing access to E-Learning on the continent
- Increasing participation in higher education using E-Learning
- Increasing collaboration among institutions of higher education
- Making a meaningful contribution to development using E-Learning

Following the Addis meeting, Derek Keats established an E-LearnAfrica Web site. It is still in the early stages of development, but users are invited to register and contribute to the discussion forums. Registration is free of charge. Go to the E-Learning URL to learn the group’s terms of reference and catch up on E-Learning news: http://www.elearnafrica.org/default.asp.

**Libraries**

The libraries group made its presentation to the plenary session with recommendations to the Partnership and to the donor community:

- If the Partnership funds an ICT project, it should ensure that the library within the institution in question conforms meets an agreed minimum standard in ICT use and status.

\textsuperscript{36} The bandwidth task force will be discussed in more detail in the following chapter.

• If the Partnership is engaged in a project, then it should ensure that library resources (ICT, information resources, etc.) needed to support the project are included in the project proposal and budget, as library-specific line items.

• The Partnership should recognize and encourage the perspective that libraries are central to wider institutional ICT development.

A number of networking and institutional recommendations were also made, which included creating a virtual network in order to share information on ICT status, and establishing a checklist for best practices and ICT minimum requirements. On the individual library level, the libraries present agreed to review their use of ICT and ICT policy, including how well library policies fit in with the wider institutional ICT policy; examine the feasibility of national-level consortia development for sustainability, if this is not already being done; lobby for equal weight and participation within institutional management, etc.

Skills sharing, networking and training

The group’s vision is to achieve a measurable increase in effective and appropriate use of ICT within the teaching, learning, research, information management, libraries, and administration processes at tertiary-level institutions in Africa.

Objectives and activities included:

• Training for ICT users and practitioners
  · Conducting a training needs analysis at each institution
  · Identifying available resources in Africa and overseas
  · Implementing training programs

• Skills sharing
  · Creating an enabling environment for staff to exchange ideas and experiences about working with staff, students, management, and the community
  · Conducting regular reviews and assessments through virtual and physical meetings
  · Carrying out case studies of best and worst practices

• Networking
  · Developing an institutional Web site to disseminate information on meetings, training programs and materials; setting up discussion groups; and establishing a directory of experts and a useful links page

Skills sharing, networking and training were discussed both separately and also collectively because it is possible to plan inter-connected activities. Examples include organizing ICT fairs and short courses at important meetings, such as the AAU General Conference. This is an excellent way to sensitize senior leaders to the importance of ICT, provide them with hands-on training, and create networking opportunities for African universities committed to ICT.

Using ICT for research

The group identified five areas of engagement:

• Learning how to use ICT to optimize the creativity of African scientists through participation in international networks and working with datasets.
• Improving the capacity of African institutions to share datasets and establish research networks.
• Accessing various kinds of research information, which would necessitate a link to the libraries group.
• Learning new methods for disseminating knowledge produced in Africa and using them.
• Optimizing the role of African institutions of higher education vis-à-vis collaboration with civil society.

The group also identified a number of issues that require attention:

• Infrastructure (bandwidth, technology, equipment, etc.).
• Policy and regulatory frameworks, particularly intellectual property rights.
• Training for users of research information. This includes training on accessing full-text literature and also on using and distributing datasets.
• Delineating the role of universities.
• Determining minimum requirements for carrying out the above activities.
• Maximizing the role of African scholars in the diaspora.
• Optimizing research into ICT in Africa and trying to ensure that universities are linked to ICT research and development, as is the case at the University of the Western Cape.

The intersection between libraries and research capacity

The ability of a library to make its holdings easily accessible to researchers is essential. The UDSM library has an OPAC for its entire system. Work started with the main collection, moving to faculties and departments once users were convinced of its utility and viability. Go to: http://www.udsm.ac.tz/library/index.htm and clicking on OPAC.
Wrapping Up

What would success look like?

- ICT would have priority at African universities.
- African universities would have an ICT policy and plans in place.
- Bandwidth would be improved.
- ICT training and support would be budget items.
- African institutions would be transformed from consumers of knowledge to world-class producers of knowledge.

As a first step in wrapping up, the group made a list of ICT priorities. Bandwidth, training, and policy were deemed most important, followed by libraries and E-Learning. Of these activities, bandwidth and E-Learning, in particular, are moving forward, as described in the next chapter.

Each of the groups was charged with writing an action plan and timeline, with the understanding that the participants gathered at the workshop could not necessarily speak for their own institutions, much less for the continent. Moreover, Partnership support could not be guaranteed for any activity. The goal of the exercise would be to bring together a cadre of committed people to propose a work plan and a set of activities, and to obtain funding.
Bandwidth was the *leitmotif* of the workshop. It is also an issue about which the presidents of the four Partnership foundations are deeply concerned. The Partnership has therefore decided to engage in a short investigation on accessing more and cheaper bandwidth. This activity will provide the Partnership foundations with sufficient information to make appropriate recommendations to their presidents on whether it would be appropriate to approach international satellite companies to request cheaper or free bandwidth for universities in any of the six Partnership countries.

Participants from the University of Dar es Salaam took the lead in bandwidth discussions during the workshop and in drafting an action plan. The University of Dar es Salaam has received a service contract from the four Partnership foundations to organize this investigation. A bandwidth team, drawn primarily from Addis workshop participants, will collaborate in this activity. The bandwidth terms of reference will be found in Appendix Seven.

A second bandwidth activity is being carried out by the International Network for the Availability of Scientific Publications (INASP). INASP is working with AfriConnect to survey and report on ways that organizations can and are improving the efficiency of their current bandwidth utilization. More information will be found on the INASP Web site: http://www.inasp.info/news/.

In addition to the Partnership bandwidth task force, Derek Keats has established an E-Learning Web site along the lines laid out in the small group sessions.

There was very little free time during the workshop, but there was ample opportunity to exchange experiences, ideas, and challenges—both met and unmet. Although many participants knew one another before the meeting, not all of them did. Gathering together in Addis Ababa gave everyone a chance to promote better networking opportunities and to bring new people into the ICT fold.

**Professor Len Liverpool, University of Jos**

“The Addis meeting provided us a unique opportunity to know about the development of ICT in the rest of the continent and to meet those who make things work in the higher education sector. It also made us aware that we have made impressive gains in Nigeria without outside support. If we can now harness donor support our chances of making a quantum leap will be quite good. We are happy we participated and look forward to many new developments.”

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38 Email to Lisbeth Levey, 3 February 2003
Networking among workshop participants has continued. In Nigeria, the University of Jos and Obafemi Awolowo University have had an exchange of ICT-related visits. Obafemi Awolowo University, which plans to implement an OPAC system for its library, is also planning a visit to Dar to see the UDSM OPAC in action. The University of Jos is looking outward, as well, and is exploring how best to use a number of non-Nigerian participants as consultants and resource people.

Tufts University hosted Tobie de Coning and Lawrence Olakunle Kehinde following the workshop. Tufts also continues its work on developing collaborative curricula. The Tufts Graduate Program in Public Health has developed workshops on collaborative public health courses, which will be offered this summer for faculty from Kenya Methodist University, the University of Dar es Salaam, and Makerere University. Tufts hopes to use KEWL software for this activity.

Partnership foundations are also looking with interest at DATAD, as it begins its next phase. DATAD is a striking example of how technology can be effectively used to collect, manage, and distribute research information. During its first three years, DATAD focused intensively on capacity building at member universities and on data entry. The database will be available online and also on CD-ROM for African institutions that do not have sufficient access to the Internet. DATAD's phase two plans entail continuing data entry at the universities already participating in the project, adding new universities, work on copyright issues, and developing a sustainable business plan.

Photos courtesy of University of Dar es Salaam library
Appendix One

Conference Participants

Addis Ababa University
Ahmed Hussien
Assistant Professor of Computer Science
Addis Ababa University
PO Box 33465
Addis Ababa, Ethiopia
251-1-564888 (telephone)
251-9-225241 (cell)
251-1-560185 (fax)
hilcoe@telecom.net.et

Ahmed Hussien
Assistant Professor of Computer Science
Addis Ababa University
PO Box 33465
Addis Ababa, Ethiopia
251-1-564888 (telephone)
251-9-225241 (cell)
251-1-560185 (fax)
hilcoe@telecom.net.et

Association of African Universities
http://www.aau.org
Yawo Assigbley
Head, Information and Communication, AAU
PO Box AN5744
Accra, Ghana
233-21-774495/761588 (telephone)
233-21-774821 (fax)
yassig@aau.org

Association of African Universities
http://www.aau.org
Yawo Assigbley
Head, Information and Communication, AAU
PO Box AN5744
Accra, Ghana
233-21-774495/761588 (telephone)
233-21-774821 (fax)
yassig@aau.org

Bayero University
Ado Dan-Isa
Department of Electrical Engineering
Bayero University
PMB 3011
Kano, Nigeria
234-64-66021 and 66834 (telephone)
234-64-665904 (fax)
danisa@tec.buk.edu.ng
ado_danisa@yahoo.com
bukmunet@yahoo.com

Bayero University
Ado Dan-Isa
Department of Electrical Engineering
Bayero University
PMB 3011
Kano, Nigeria
234-64-66021 and 66834 (telephone)
234-64-665904 (fax)
danisa@tec.buk.edu.ng
ado_danisa@yahoo.com
bukmunet@yahoo.com

Eduardo Mondlane University
http://www.uem.mz/
Venancio Massingue, Vice Rector
Eduardo Mondlane University CP 257
Maputo, Mozambique
258-82-300271 (cell phone)
258-1-307272 (fax)
carlotta@nambu.uem.mz

Eduardo Mondlane University
http://www.uem.mz/
Venancio Massingue, Vice Rector
Eduardo Mondlane University CP 257
Maputo, Mozambique
258-82-300271 (cell phone)
258-1-307272 (fax)
carlotta@nambu.uem.mz

Francisco Mabila, Deputy Director
Informatics Centre
Eduardo Mondlane University CP 257
Maputo, Mozambique
2581-492601 and 494752/4 (telephone)
258-82-305396 (mobile)
mabila@nambu.uem.mz and mabila@uem.mz

International Network for the Availability of Scientific Publications
http://www.inasp.info
Martin Belcher
INASP Training Programme Manager
3-10 Berkeley Square
Bristol, UK
44-117-928-7084 (telephone)
44-117-928-7112 (fax)
mbelcher@inasp.info

Inter-University Council of East Africa
http://www.iucea.org
Phillip Ouma Ayoo
IUCEA
PO Box 7110
Kampala, Uganda
256-41-256251/2 (telephone)
256-41-342007 (fax)
payoo123@hotmail.com

Inter-University Council of East Africa
http://www.iucea.org
Phillip Ouma Ayoo
IUCEA
PO Box 7110
Kampala, Uganda
256-41-256251/2 (telephone)
256-41-342007 (fax)
payoo123@hotmail.com

Kwame Nkrumah University of Science and Technology
http://www.knust.edu.gh/
Professor Keshaw Singh, Director
Kumasi Virtual Centre for Information Technology
Kwame Nkrumah University of Science and Technology
Kumasi, Ghana
233-51-60013 (telephone)
233-51-60023 (fax)
kevas@hotmail.com or ksingh@avu.org

Kwame Nkrumah University of Science and Technology
http://www.knust.edu.gh/
Professor Keshaw Singh, Director
Kumasi Virtual Centre for Information Technology
Kwame Nkrumah University of Science and Technology
Kumasi, Ghana
233-51-60013 (telephone)
233-51-60023 (fax)
kevas@hotmail.com or ksingh@avu.org
Makerere University
http://www.makerere.ac.ug
http://www.makerere.ac.ug/dicts
Phillip Kasaija
Department of Political Science
Kampala, Uganda
256-77-409-724 (telephone)
256-41-534-181 (fax)
kasaijap@yahoo.com

F.F. Tusubira, Director
Directorate for ICT Support
Flat B5 Lincoln Flats
Makerere University Main Campus
256-41-541343 (telephone)
256-41-542377 (fax)
tusu@dicts.mak.ac.ug

Ministry of Education (Ethiopia)
Andrew Schofield,
IT Advisor to Higher Education
251-1-568973; 553133 x 305 (telephone)
ITAdvisorMoE@softhome.net
ITAdvisorMoE@yahoo.com

National Research Foundation (South Africa)
http://www.nrf.ac.za/
http://www2.frd.ac.za/uninet/history
Mike Lawrie
Consultant, Academic Support Network
27-12-481-4148 (telephone)
27-12-349-1179 (fax)
mlawrie@apies.nrf.ac.za

National Universities Commission (Nigeria)
Mamman Ibrahim Aminu
Deputy Director
234-9-413-541 (telephone)
234-9-4133520 (fax)
ibrahim@nuc.edu.ng and aminu@widernet.org

Obafemi Awolowo University
http://www.oauife.edu.ng
Lawrence Olakunle Kehinde
Information and Technology Communications Unit
Ile-Ife, Nigeria
234-36-232 356 (telephone)
234-36-230 663 (fax)
lkehinide@oauife.edu.ng and lokehinide@yahoo.com

Tufts University
http://www.tufts.edu
Steve Cohen
Senior Learning Technologist
16 Dearborn
Medford, Ma. 02155, USA
1-617-627-3082 (telephone)
1-617-627-3667 (fax)
steve.cohen@tufts.edu

UN Economic Commission for Africa
PO Box 3001
Addis Ababa, Ethiopia
251-1-51-72-00 and 51-12-31 (telephone)
241-1-514416 (fax)

Pearl Robinson, Director, Curriculum Co-
Development Project, Tufts University and
Visiting Professor, University of Dar es Salaam
PO Box 35042
Dar es Salaam, Tanzania
255-22-2410130 (telephone)
255-22-2410084 or 255-22-2410395 (fax)
pearl.robinson@tufts.edu

14 Mamman Ibrahim Aminu was unable to participate at the last moment, but he submitted considerable documentation in advance of the meeting.
University of Dar es Salaam
http://www.udsm.ac.tz
Tolly Mbwette, Professor of Environmental Engineering
Prospective College of Engineering and Technology
University of Dar es Salaam
PO Box 35131
Dar es Salaam, Tanzania
255-22-2410365 (telephone)
mbwette@wrep.udsm.ac.tz and tsambwette@yahoo.com

Mubah Nyirabu, Senior Lecturer
Department of Political Science and Public Administration, University of Dar es Salaam
PO Box 35042
Dar es Salaam, Tanzania
255-22-2410357 (telephone)
255-22-2410084 (fax)
Mohabenyirabu@hotmail.com

University of Ghana
http://www.ug.edu.gh
Mumuni Dakubu
Director
University ICT Centre
University of Ghana
Chemistry Department
Accra, Ghana
233-021-508099/502262 (telephone)
233-021-502262 (fax)
mdukubu@ug.edu.gh

University of Jos
Stephen Akintunde
Deputy University Librarian (Systems)
University of Jos

PMB 2084
Jos, Plateau State
Nigeria
S_askintunde@hotmail.com and akins@unijos.edu.ng

Len Liverpool
234-73-611839 and 611918 (telephone)
liverpool@unijos.edu.ng and lsoliverpool@yahoo.com

University of Namibia
http://www.unam.na
Peter Bateman
Coordinator, Interactive Multimedia Services
University of Namibia
Private Bag 13301
Windhoek, Namibia
264-61-206 3916 (telephone)
264 61 206 3361 (fax)
pbateman@unam.na

Charmaine Villet
evillet@unam.na

University of Stellenbosch
http://www.sun.ac.za/distanceeducation
Tobie de Coning
Head, Division of Distance Education
University of Stellenbosch
Private Bag x1
Stellenbosch, South Africa
27-21-8083563 (telephone)
27-21-8083565 (fax)
tjdc@sun.ac.za

University of the Western Cape
http://www.uwc.ac.za
http://www.uwc.ac.za/library/
Derek Keats
Executive Director, Information and Communication Services
University of the Western Cape
Bag X17
Bellville 7535, South Africa
27-21-959 2304 (telephone)
27-21-959 2775 (fax)
dkeats@uwc.ac.za

Ellen Tise
University Librarian
University of the Western Cape
27-21-959 2947 (telephone)
27-21-959 1348 (fax)
etise@uwc.ac.za

University of Ghana
http://www.ug.edu.gh
Mumuni Dakubu
Director
University ICT Centre
University of Ghana
Chemistry Department
Accra, Ghana
233-021-508099/502262 (telephone)
233-021-502262 (fax)
mdukubu@ug.edu.gh

University of Jos
Stephen Akintunde
Deputy University Librarian (Systems)
University of Jos
Partnership for Higher Education in Africa

Carnegie Corporation of New York
http://www.carnegie.org
437 Madison Avenue
New York, New York 10022
1-212-371-3200 (telephone)
1-212-223-9822 (fax)
Rookaya Bawa
rba@carnegie.org

Gloria Primm Brown, Consultant

Andrea Johnson
aj@carnegie.org

Narciso Matos
nma@carnegie.org

Connie Solomon
cs@carnegie.org

Ford Foundation
http://www.fordfound.org

Ahmed Bawa
Southern Africa Office
P.O. Box 30953
Braamfontein 2017
Johannesburg, South Africa
27-11-403-5912 (telephone)
27-11-403-1575 (fax)
a.bawa@fordfound.org

Eastern Africa Office
PO Box 41081
Nairobi, Kenya
254-2-271-0444 (telephone)
254-2-271-2203 (fax)

Anne-Marie Griffin
a.griffin@fordfound.org
Mary Ngolovoi
m.ngolovoi@fordfound.org
Katharine Pearson
k.pearson@fordfound.org

MacArthur Foundation
http://www.macfound.org
Kole Shettima
Nigeria Office
2 Ontario Crescent
Maitama, Abuja, Nigeria
234-9-413-2920, 413-2965 (telephone)
234-9-413-2919 (fax)
k.shettima.macarthur@skannet.com

Rockefeller Foundation
http://www.rockfound.org

420 Fifth Avenue
New York, New York 10018, USA
1-212-869-8500 (telephone)
1-212-852-8278 (fax)
An R. Trotter
atrotter@rockfound.org

Partnership Facilitator
http://www.foundation-partnership.org

Lisbeth Levey
New York University
239 Greene Street, Room 317
New York, New York 10003, USA
1-212-998-5514 (telephone)
1-212-995-4041 (fax)
al9@nyu.edu

Conference Rapporteur Ruth Thomas, Consultant,
Nairobi, Kenya
ruthannathomas@yahoo.com
Appendix Two

Final Conference Agenda

Monday, July 29

Morning Facilitator: Venancio Massingue, except for “Official Opening”
Afternoon Facilitator: Tolly Mbwette

9:00 am  Welcome and Logistics
          Lisbeth Levey

9:10 am  Introductions by Participants

9:30 am  Official Opening
          Chair: Karima Bounemra Ben Soltane

          Welcoming Remarks
          Teshome Yizengaw, Vice Minister of Education

          Welcome from the Partnership for Higher Education in Africa
          Kole Shettima

          Welcome from the UN Economic Commission for Africa
          Lalla Ben Barka, Deputy Executive Secretary, UNECA

10:00 am  The Impact of Infrastructure, Regulation, and Funding on African Universities
          Aida Opoku-Mensah

10:20 am  Questions and Discussion

11:00 am  Coffee/Tea Break

11:30 am  Setting the Baseline: ICT implementation in African Universities
          Eduardo Mondlane University
          University of the Western Cape
          University of Namibia
          Makerere University
University of Dar es Salaam
Ghana (Kwame Nkrumah University of Science and Technology; the University of Ghana)
Nigeria (Bayero University, Obafemi Awolowo University, University of Jos)

1:15 pm Lunch

2:00 pm Continental, Regional, and National Networks
The Association of African Universities, the Inter-University Council of East Africa, the National University Council of Nigeria, the South African Experience

3:45 pm What Are We Learning?
Questions and Discussion

4:30 pm Small Groups: Where Do We Want to Go and How Can We Get There?
Each group was charged with addressing the following issues:

- How do universities become part of the national ICT agenda? Are the ICT needs of universities represented in sub-regional, regional, and international bodies?
- What strategies should universities pursue in order to get reduced prices for bandwidth? Should those strategies involve sub-regional, regional, and international organizations?

5:30 pm Adjourn

Tuesday, July 30, 2002
Morning Facilitator: Lishan Adam
Afternoon Facilitator: Mumuni Dakubu

9:00 am Report Back from Small Groups and Discussion

10:30 am Coffee/Tea Break

11:00 am Using ICT for Distance Education: What Does It Take?
Tobie de Coning, University of Stellenbosch

11:20 am Questions, Sharing Experiences and Plans

1:00 pm Lunch

2:00 pm Using ICT to Transform Teaching and Learning
The Tufts/Dar/Makerere CCD Experience
The University of Namibia
The University of the Western Cape

3:00 pm Questions, Sharing Experiences, and Plans
4:00 pm  Tea/Coffee Break

4:15 pm  **Small Groups**
Participants broke into two small topical groups, with assignments for each one:
Bandwidth
E-Learning

5:15 pm  **Small groups report back**

6:00 pm  Reception (at UNECA)

**Wednesday, July 31, 2002**

Establishing Criteria Facilitator: Ellen Tise
Plan of Action Facilitator: Katharine Pearson

9:00 am  **Establishing Criteria for and Selecting Different Electronic Media**
**Group Discussion on:**
* Computer-assisted course development software
* Online courses
* E-journals and E-books
* Internet Web sites

What’s out there? What are the technical and other requirements for effective utilization? What are the problems?

10:00 am  Tea/Coffee Break

10:15 am  **Plan of Action**

1:00 pm  Adjourn and Lunch (Afternoon open)

**Thursday, August 1**

Facilitator: Narciso Matos

9:00 am  **Plenary Session**

10:00 am  Tea/Coffee

10:15 am  **Small Groups**
* Libraries
* Policy
* Skills Sharing, Networking, and Training
* E-Learning
* Using ICT to Promote Research
* Bandwidth
12 noon  Plenary Session and Final Recommendations

1:00 pm  Adjourn and Lunch
Appendix Three

National and Institutional ICT Profiles

Because ICT implementation in universities depends on infrastructure coupled with a conducive regulatory environment, meeting participants from the six Partnership countries were asked to prepare written documentation in advance, as follows:

**National Profile**

Regulatory and Legal Framework (planning, policies, and laws)
Extent of ICT infrastructure and connectivity
Funding for ICT, including donor support

**Institutional Profile**

Status of Internet connectivity
ICT strategic planning—whether university has a strategic plan, lines of authority, implementation
Type of Internet link (VSAT, wireless, leased line, dial-up, etc.) and name of provider
Amount of bandwidth and costs—whether bandwidth is sufficient, projected bandwidth requirements in one year and in five years
Existence of campus backbone, including details on WANs, LANs, and network points
ICT software packages being used (for teaching and learning, the libraries, administration, etc.)
How major ICT hardware and software purchasing decisions are made
How ICT maintenance is handled
Human resource needs
Extent to which students and staff have access to computers, email, and the Internet. Costs for access, if any
Funding for ICT implementation—both university-wide and project-specific, such as the library (from the government, from the university, from donors)
Major challenges
Success stories
Appendix Four

Learning about online resources

Distance Education at a Glance
http://www.uidaho.edu/evo/distglan.html

The University of Idaho Faculty of Engineering prepared this guide to help teachers, administrators, facilitators, and students understand distance education.

How to Develop an Online Course
http://stylusinc.com/online_course/tutorial/process.htm

Developed by Priya Williams, Web Designer, Stylus Systems Pvt.Ltd., this is a tutorial that will help convert a simple paper course/seminar into an online course/seminar.

Knowledge Environment for Web-based Learning
http://kewl.uwc.ac.za/

KEWL is an open-source courseware package developed at the University of the Western Cape in South Africa. It includes all the tools necessary to run and manage an online course. KEWL is available free of charge. For an example of KEWL output, go to Seawood Africa: http://www.seaweedafrica.org/.

Maryland Faculty Online: Technology Training Curriculum
http://www.mdfaconline.org/train_curr.html

Designed by the University of Maryland, this curriculum presents critical issues common to all institutions: establishing and incorporating standards of good practice, integrating instructional technologies into curricula, securing resources, providing incentives for faculty, and measuring outcomes through carefully designed assessment strategies.

MIT Open Courseware Initiative
http://ocw.mit.edu/index.html
MIT states that the goal of its Open Courseware Initiative is "to make MIT course materials that are used in the teaching of almost all undergraduate and graduate subjects available on the web, free of charge, to any user anywhere in the world. MIT OCW will radically alter technology-enhanced education at MIT, and will serve as a model for university dissemination of knowledge in the Internet age." Although the Initiative won’t be formally launched until September 2003, some materials are available on the site now and it is possible to register for updates.

**Producing and Teaching an Online Course**

http://141.225.246.182/online/ptoc.htm

Guide and manual developed at the University of Memphis for developing courses using Web-CT. Overall discussion useful for any software package.

**Virtual Resource Site for Teaching with Technology**

http://www.umuc.edu/virtualteaching

The Virtual Resource Site for Teaching with Technology was developed by the University of Maryland University College and was designed to be used by instructors anywhere in the world. It contains 40 examples of assignments or exercises used in online courses at various institutions. Examples are organized by the type of technology used, as well as by the type of learning activity the modules are meant for.

**World Lecture Hall**

http://www.utexas.edu/world/lecture/

The World Lecture Hall publishes links to pages created by faculty worldwide who are using the Web to deliver course materials in any language. Some courses are delivered entirely over the Internet. Others are designed for students in residence. Many fall somewhere in between. In all cases, they can be visited by anyone interested in courseware on the Internet - faculty, developers, and curious students alike. The Web site is not updated regularly, however. (The last update was in December 2001.)
Appendix Five

Glossary of Terms for Online Journals

Just as you can subscribe to print journals in many ways—by purchasing individual journal titles through a publisher or by consolidating your subscriptions with a vendor, you can use a variety of mechanisms to access and subscribe to journals online. The glossary below is meant as a guide to some of the more arcane terms involved in the distribution models of electronic publishing; the glossary may appear more relevant to librarians than to users, but anyone who makes decisions concerning accessions, including university administrators and teaching staff, should understand the different ways e-journal publishers and distributors work because it affects ease of access, budgeting, and finances.

Aggregator and Gateway Services

The first term is the most complicated and confusing because there are similarities and differences between aggregators and gateways. Indeed, in some instances, aggregators and gateways are merging to become one.

Aggregators are to online publishing as vendors or subscription agents are to print. Instead of selling subscriptions to hard copy, they provide links on their Web pages to e-journals that are produced by a number of different publishers.

Some aggregators require that you subscribe to all of the journals in their "bundle"; others let you pick and choose. This distinction is very important; before subscribing to a "bundled" service, it is essential to evaluate whether the journals included in the "bundle" will justify the cost. How many of the journals will users want to read regularly, and what would an individual subscription cost? If the amount is lower than a "bundled" subscription, don't use the aggregator for your subscription services.

The big advantage to accessing journals through aggregators is that they provide a single interface and access route to a large number of journals so you don't need to worry about lots of different usernames, passwords, and search engines.

Gateways provide services to publishers and to users. Stanford University's HighWire, for example, works with learned-society publishers to package their journals electronically and to add value to the content. You can go to the HighWire Web site to select one or more journals and to search across journal titles, but you are then linked to the publisher's Web site for actual access.

Finally, some aggregators and gateways are attempting to establish a "one stop shop" in that you can search across multiple databases, consult tables of contents and abstracts to many journals, and then link to journal titles. The aim is to bring all services together for the ease of the user.
Current Awareness

Current awareness information allows you to keep abreast of recent developments in your field. You can register for free table of contents and topic alerts. A number of services offer current awareness information free of charge—journal publishers, aggregator services, and other organizations. This is discussed more fully in the following pages.

Distribution by Author

Many researchers now mount their research results on the Web without intermediaries, such as a journal publisher. They may have their own home page, for example, or they may use an e-print service, such as the physics preprint server, BioMed Central, and the Open Access Initiative (described later in this guide). In essence, the whole concept of scholarly communication is changing.

Methods of Accessing Full-Text

Some journals, such as the British Medical Journal, are available online free of charge. You do not need to worry about "authentication." Some systems require a password; still others register the IP (Internet Protocol) address of the computers allowed to access the journals in question. No password is required; users simply log on.

In addition, it is possible to pay to download the full text of journal articles. Some journals allow you to pay for timed access to an entire issue, usually 24 hours. Others only permit access to the article you have selected. Credit cards are usually required for "pay-per-view" privileges.

Pricing Models

Some publishers provide free electronic access to print subscribers. Others offer electronic access at a surcharge. An increasing number of publishers offer the option of subscribing to the electronic version only. In addition, as mentioned above, some aggregators require libraries to subscribe to a bundle of journals.

Primary Publisher

Commercial organizations, learned societies, universities, etc. are directly responsible for publishing monographs, journals, and other publications. They solicit, review, select, edit, package, and distribute their publications. Publishers run the gamut in size and price—from large commercial publishers, such as Elsevier, to smaller learned society publishers. But these differences are beginning to blur, particularly because some learned societies are turning their publishing over to academic and commercial publishers.

Supply Models

Price and supply models go hand in hand. Journals can be supplied through a vendor by license—occasionally for a single user, more typically for multiple users. The license determines how many people can access the journal simultaneously. It is possible to take out a site-wide license, which is calculated according to the number of users at your institution. Countrywide licenses are also possible. Increasingly, many institutions are forming consortia to negotiate jointly with vendors and publishers to lower costs.
Appendix Six

Coalition of South African Libraries Evaluation Criteria

The Coalition of South African Libraries (COSALC) Evaluation Criteria may be useful to your institution. COSALC recommends completing a separate table for each journal or database that is being evaluated.

Title of database
Publisher
Subjects covered

Determine the priority of each question, as follows:

1 = Absolute requirement
2 = Non-absolute requirement
3 = "Nice to have" but not required

Please evaluate each database with relation to the experience of your own institution. To be assessed on a scale of 1-4, as follows:

1 = Poor
2 = Sufficient/Moderate
3 = Good
4 = Excellent

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<th>Remarks</th>
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<td>Timeliness of updates. How quickly are new issues made available?</td>
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<td>Years of coverage: are there any gaps in coverage?</td>
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<td>Does the publisher remove back issues from the site after a certain period?</td>
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<td>Is the database accurate? e.g. input/journal errors</td>
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<td>Does this database duplicate what is already available in your library?</td>
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<td>24 x 7 access via high specification stable platform, with stable URLs?</td>
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<td>Unlimited viewing, downloading and printing in agreement with copyright law?</td>
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<td>Have you seen a copy of the licence agreement?</td>
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<td>Multiple forms of access should be possible - IP address and</td>
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<td>Conformance to Web Accessibility Initiative (<a href="http://www.w3.org/WAI">http://www.w3.org/WAI</a>) and the use of open standards wherever possible</td>
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<td>Are specific browsers or non-standard plug-ins needed (e.g. Flash) for any of the material</td>
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<td>Notification of discontinuation / cancellation of any journals offered, with credit as appropriate</td>
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<td>Delivery of high levels of concurrency without degrading service quality</td>
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<td>Screen layout / use of colour/ buttons clear?</td>
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<td>Proximity operators</td>
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<td>Limiting (e.g. by year, publication type, language, full text, other)?</td>
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<tr>
<td>Combining search sets</td>
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<tr>
<td>Modify a search (without re-keying)</td>
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<tr>
<td>Can you narrow/widen a search?</td>
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<tr>
<td>Can you return to the search after printing a citation / article?</td>
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<tr>
<td>Can you see a list of searches done so far?</td>
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<tr>
<td>Is multifile (broadcast) searching possible?</td>
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<tr>
<td>If so, is duplicating of results possible?</td>
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<tr>
<td>Can searches be stopped/cancelled at any time?</td>
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</tbody>
</table>

<table>
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<tr>
<th>Full-Text Options</th>
<th>Y/N</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explanation of partial contents for user (e.g. omits tables or pictures)</td>
<td></td>
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<tr>
<td>Are page images completely legible? How are graphics/images handled?</td>
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<tr>
<td>Is text in format that supports both text &amp; graphics (e.g. HTML, PDF)?</td>
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<tr>
<td>Are multiple image formats provided (browsing / detailed viewing)?</td>
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<tr>
<td>Is there a document outline allowing user to jump to specific page?</td>
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<tr>
<td>Link to references, appendices, etc.?</td>
<td></td>
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</tr>
<tr>
<td>Display / Save / Print and Export Functions</td>
<td>Y/N</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>Remarks</td>
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<tr>
<td>-------------------------------------------</td>
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</tr>
<tr>
<td>Is there a choice of formats for display (brief / full / user-defined)?</td>
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<tr>
<td>Sort options available (alphabet-ic / chronological/ other)?</td>
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<tr>
<td>Easy to scroll through hits (from list to single record to full-text)?</td>
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<tr>
<td>Can &quot;useful&quot; records be marked for printing/saving?</td>
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<tr>
<td>Able to specify format for printing (e.g. full, citation)</td>
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<tr>
<td>Can you save to disk or email (pages / parts of pages / full documents)?</td>
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<tr>
<td>Easy to move between citation and full-text?</td>
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<tr>
<td>Can oversize documents be scaled down for printing?</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Support</th>
<th>Y/N</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the database suffer recurring slow response periods or down time?</td>
<td></td>
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<tr>
<td>Does the vendor undertake to maintain an adequate infrastructure to support demand on the database</td>
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<td>Is technical assistance given promptly?</td>
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<td>• by telephone</td>
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<td>• e-mail</td>
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<td>• online</td>
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<tr>
<td>• visits</td>
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<tr>
<td>Online tutorial available?</td>
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<tr>
<td>Is training provided?</td>
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<tr>
<td>• individual</td>
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<td>• workshops</td>
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<td>• regularly</td>
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<td>• at a cost</td>
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<tr>
<td>Availability of any brochures and training materials?</td>
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</table>
## Help Facility

<table>
<thead>
<tr>
<th>Help Facility</th>
<th>Y/N</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are there any help screens?</td>
<td></td>
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<tr>
<td>Are they easily accessible / plain English?</td>
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<tr>
<td>Context specific</td>
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<tr>
<td>Good examples</td>
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<tr>
<td>Detailed and clear</td>
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<tr>
<td>Are there any error messages?</td>
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## General

<table>
<thead>
<tr>
<th>General</th>
<th>Y/N</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facilities for badging must be permitted</td>
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<tr>
<td>Multiyear agreement</td>
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<tr>
<td>Free trial period</td>
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<tr>
<td>High quality usage statistics, conforming to the emerging work of the PALS Usage Statistics</td>
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<tr>
<td>Working Group and the ICOLC Guidelines (see <a href="http://www.library.yale.edu/consortia/webstats.html">http://www.library.yale.edu/consortia/webstats.html</a>)</td>
<td></td>
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<tr>
<td>Are the usage statistics easy to retrieve?</td>
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<td>Are they regular available?</td>
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<td>• monthly</td>
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<td>• quarterly</td>
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<tr>
<td>• annually</td>
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<tr>
<td>Can the usage statistics be user defined?</td>
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<td>Help desk service (operated 24 x 7?)</td>
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<tr>
<td>Pricing</td>
<td>Remarks</td>
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<td>------------------------------------------------------------------------</td>
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<tr>
<td>Is consortium pricing available?</td>
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<tr>
<td>With or without separate invoicing for individual institutions?</td>
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<td>What approach are followed within the consortium pricing?</td>
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<td>Is it flexible?</td>
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<td>How many simultaneous users are included in the consortium price?</td>
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<tr>
<td>Are individual databases available to individual institutions?</td>
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<tr>
<td>Does the consortium have to agree on a suite of databases? (all or nothing)</td>
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<td>How does the price compare with other similar packages?</td>
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</table>

**Additional comments / observations**

**Recommendation**
In Addis Ababa, conference participants agreed that bandwidth is a critical issue for African universities. Without better bandwidth, there can be no meaningful utilization of ICT for teaching, learning, research, or management.

The activity proposed below is designed to respond to the interest of the Partnership presidents in assisting to leverage additional bandwidth for the universities that the Partnership supports in Africa by directly approaching one or more satellite companies. If the presidents are to use their influence in a productive way, they need to have sufficient information on four issues:

- Which companies are selling bandwidth to Africa or would be able to do so;
- Which companies have spare bandwidth to donate or sell cheaply for use in African universities;
- Which companies might be amenable to an approach from the Partnership; and
- Whether access to more bandwidth could be tapped by the universities that the Partnership supports, using their existing or planned infrastructure.

These questions are complicated by the fact that economic, market, and regulatory conditions differ in the six Partnership countries. In South Africa, the university network has been able to work with the government, the higher education sector, Telkom, and the donors to create TENET. In Uganda, there appears to be a burgeoning local market and competition, which is lowering bandwidth costs for everyone. In the remaining countries, universities primarily rely on VSAT systems. It is important to have a better understanding of conditions on the ground in the countries in which the Partnership is active to determine the feasibility and usefulness of intervention.

Assignment: The objective of this activity is to ascertain whether there is a useful role for the Partnership, particularly the foundation presidents, in leveraging cheaper bandwidth from the satellite companies. At this time, no further Partnership action is envisaged.

At the conference in Addis Ababa, the University of Dar es Salaam volunteered to be responsible for coordinating a follow-up bandwidth activity and for hosting a secretariat. The group will take responsibility for the investigation outlined here.

Terms of reference include:
In Africa:

- Identifying the ways in which telecommunications regulatory conditions, pricing, and marketing impact the higher education community. Highlighting the kinds of policy and regulatory frameworks that must be in place to ensure that the universities can take advantage of any offers made by the satellite companies.
- Assessing much bandwidth is being used now, how much bandwidth will be required in one year, how much in five years. Projecting to the extent possible bandwidth requirements and what activities bandwidth might be used for. (For example: How much library needs; teaching and research applications)
- Estimating the types and magnitude of human resource requirements to manage bandwidth and maintain increased use.
- Identifying how universities might sustain the use of bandwidth. (Can they use the promise of free or cheaper bandwidth to leverage more cooperation within the universities and outside of the universities-within the educational sector, with the government, etc.?)
- Determining the types of training that will be necessary-technical, managerial, and for academic applications. (Are appropriate mechanisms within the university already in place? If not, what needs to be done?)
- Assessing the sufficiency of current university infrastructure to support increased bandwidth. (The campus backbone, local area networks, computers, etc.)
- Assessing the potential for collaboration between universities within and across countries to create national or regional economies of scale for reducing bandwidth costs and increasing opportunities to share material.

Outside Africa:

- Assembling material on ICT status in the relevant Partnership countries, to complement the work carried out by the university representatives to the bandwidth task force.
- Identifying satellite providers with surplus bandwidth that could be donated or sold more cheaply to the Partnership countries and universities.
- Determining whether any satellite providers have previously provided free or discounted bandwidth and, if so, how these contracts were negotiated.
- Making recommendations on how best to approach the satellite companies, including identifying the key points of leverage and the decision makers within the bandwidth companies with whom the Presidents might interact.

Some of this material already exists in print and on the Web. Mike Jensen, a well-known ICT consultant, who maintains the most up-to-date Web site on ICT in Africa, recently completed a case study of Ethiopia for the International Telecommunications Union (ITU), which is a model for the kind of assessments required. ITU also commissioned a similar study for Uganda in 2001. Both studies are on the ITU home page: http://www.itu.int/osg/spu.

In addition, UNECA's Africa Information Society Initiative has country information for each Partnership country. These entries can be found at: http://www.uneeca.org/disd/ict. Finally, UNECA collaborated with UNESCO and UNDP in convening an ad hoc ICT experts meeting in Nairobi in 2001. Several of the papers prepared for this conference are relevant, including one on ICT for higher education in Ghana and one that examined lessons from Asia and their relevance for Africa.
Methods: The investigation will begin on 1 February 2003 and conclude on 31 July 2003. Implementation involves the following components.

- Creation of a small committee, with representation from each of the Partnership countries:
  - Tanzania: Beda Mutagahywa, Director of the University of Dar es Salaam Computer Centre, and Tolly Mbwette, Professor, Civil Engineering and the Built Environment, University of Dar es Salaam
  - Ghana: Mumuni Dakubu, Director, University of Ghana ICT Centre
  - Mozambique: Venancio Massingue, Deputy Rector, Eduardo Mondlane University
  - Nigeria: Mamman Ibrahim Aminu, Director, University ICT Activities, National Universities Commission
  - South Africa: Derek Keats, Executive Director, Information and Communication Services, University of the Western Cape
  - Uganda: F.F. Tusubira, Director, Directorate for ICT Support, Makerere University

Each of these individuals was previously selected for the task force at the Addis Ababa meeting in July 2002.

- In addition, Aida Opoku-Mensah, who is UNECA's Team Leader for Promoting Information Technology for Development, and Mike Jensen, will be added to the committee as resource people. Jensen will concentrate on the political economy and technology of bandwidth from an international perspective. Lisbeth Levey, Partnership Facilitator, will also be appointed, as an ex officio member.

- The University of Dar es Salaam will establish an e-mail list in February 2003 to begin delineating the parameters and specific terms of reference for country/university surveys.

- The University of Dar es Salaam will host a meeting in Dar es Salaam in March 2003. Each member of the group will come to the Dar meeting with a draft document for discussion.

- Following the March meeting, committee members will return to their institutions to continue to work on their assignments. Draft documents will be circulated for review using the email list. Each member's report should be finalized by early May.

- The University of Dar es Salaam will draft a report to the Partnership following receipt of every member's final report. This report will be ready for review by the team in mid May. At this point, the group might be widened to include one or two experts in the United States.

- If this investigation provides sufficient basis for consideration of an intervention strategy by the Partnership, there would be a second meeting in New York in June 2003. This gathering would focus specifically on appropriate interventions by Partnership presidents and officers. Up to four members of the investigative team from Africa would attend the New York meeting. One or more outside specialists outside Africa would also be invited to the New York meeting.

- The final report, which will be a collaborative effort of the entire team and coordinated by the University of Dar es Salaam, will be written and sent to the Partnership in July 2003.