The Changing African Context: Welcome & Goals of the Forum

*Njabulo Ndebele, Chair: Forum Steering Committee,  
Vice Chancellor, University of Cape Town; Chair, Association of African Universities*

In his welcome speech, Professor Ndebele expressed his great pleasure at this collaboration of African academics from the worlds of science and technology. He also extended sincere greetings to participating government representatives and private sector organizations who are, and will be, key to the success of any future collaborative efforts around the complex issues being addressed at this forum. He hoped that the latter would be a success in terms of providing an opportunity to share perceptions and perspectives on the role of the modern African university in harnessing ICT for economic development.

He personally thanked Joyce Lewinger Moock of the Rockefeller Foundation for her involvement in the Partnership for Higher Education in Africa (PHEA) which initiated the forum and developed it in conjunction with the following co-sponsors: the Association of African Universities, the US National Academy of Sciences and the African Academy of Science. Ndebele closed his opening address by reemphasizing the main aim of the forum – strengthening the relationship between the higher education sector (represented by university vice-chancellors) and the science and technology sector (represented by the science academies) in Africa in order that they can apply ICT for economic development and innovation and so increase educational opportunities and reduce poverty.
Session 1: Developing & Implementing Knowledge Strategies for Enhancing Growth & Poverty Alleviation in Africa

Chair: Njabulo Ndebele, Vice-Chancellor, University of Cape Town

Panelists:
Mohammed Hassan, President of the African Academy of Sciences (AAS)
Akilagpa Sawyerr, Secretary-General, Association of African Universities
Venâncio Massingue, Minister of Science and Technology, Mozambique

In this opening session, senior African leaders of education provided perspectives on the following ‘big picture’ questions: What are the current challenges to accelerating Africa’s economic growth? What role can African universities play in the 21st century in applying knowledge toward innovations for accelerating economic growth?

Njabulo Ndebele reminded the floor that although all those present are from, or are representatives of, ‘industrializing’ countries with various localized challenges and/or external pressures that have a decisive impact on their development, it is important that, in terms of major currents in thinking as regards education, a special effort be made in the context of this forum, to visualize Africa as a single entity.

Principally, this is because of the following reasons:

1. That Africa is characterized by increasing political stability and democracy.
2. The prevailing (continental) objective of good governance, which is key to overall stability.
3. The presence of peer-review mechanisms that allow evaluation according to internationally agreed standards.
4. The widespread ‘trend’ of conflict resolution and the extant culture of peace-building, both of which have led to the lowering of political tensions and steadily emerging economic (continental) growth.

As a result of the above, Africa is at a new ‘phase’ in infrastructure development, one that involves transport, communication and energy. This has brought to the fore a new set of challenges, namely:

1. Confronting the dominance of the extra-Africa knowledge economy.
2. Achieving economic growth and protecting the (natural) environment.
3. Ensuring that the role of higher education in promoting economic growth is understood by the public, private and civil sectors.
4. That education becomes an asset and a key economic feature of modern Africa, as it now is for China and India.

Ndebele concluded by saying that future directions must involve more African economies, and that we will have to confront and tackle the way(s) that governments work with universities. This in turn will involve universities themselves tackling issues of funding and financing, the renewal of infrastructure and the strengthening of gender equity. Moreover, such changes and improvements must happen at both the institutional and system level in order for higher education in Africa to become a passport to global citizenship.
Martin Hall then introduced the next speaker – **Mohammed Hassan**, President of the AAS, who gave a PowerPoint™ presentation in ‘answer’ to the session’s formative questions.

For Hassan, the challenges to achieving sustainable economic growth in any country in Africa revolve around politics and education, namely:

- Issues of democracy and good governance, i.e., political reform, with the watchwords including transparency, openness and accountability
- Having in place solid private and public sector infrastructure that will attract foreign investment and partnerships
- Fostering centres of excellence, i.e., ensuring that universities deliver quality education and world-class research facilities, that are inextricably linked to the world at large
- Building local and regional capacity to address critical issues (WEHAB)
- Developing and implementing strategies that link cutting-edge science and technology (S&T) to Millennium Development Goals (MDGs) and build capacities in emerging technologies
- Keeping intellectually abreast of emerging technologies around the globe
- Ensuring sustainable funds for research and innovation that not only keep African countries abreast of global developments but enable them to retain their brightest graduates
- Being able to fully implement global political, economic and social recommendations/decisions.

In terms of the future role and profile of S&T and universities in Africa, Hassan sees the following as fundamental requirements:

- Training new generations of scientists
- Contributing to problem-solving research, at inter- and intra-university levels as well as through collaborations and/or partnerships with the public/private sector
- Developing closer partnerships with academies of science in Africa
- Broadening the geographical range and saturation of their information dissemination.

Hassan brought his presentation to a close with a number of general conclusions. In brief, these were as follows:

- Africa needs a new generation of home-grown, problem-solving, world-class scientists to lead science-based development in the continent. This can only be achieved through establishing an effective science, technology and innovation (STI) system of world-class research universities
- Success stories highlighting achievements of universities in contributing to economic growth need to be identified, published and widely distributed
- Increased financial allocations for higher education and STI development in Africa should first and foremost come from African governments
- African leaders are increasingly recognizing that science, technology and innovation are essential to lead and implement strategies to achieve the UN Millennium Goals.
- 2007 must be the year of explicit commitment, implementation and action towards investing in S&T in Africa
- World-class research universities alone cannot accelerate economic growth in Africa – the impetus must come from within the continent.
Akilagpa Sawyerr, Secretary-General of the AAU was next to address the floor. He began by looking at the global context of STI and then examined the position from the African point of view. In discussing the latter, Sawyerr highlighted the following as important points to bear in mind:

- The manipulation of trade rules/agreements by, and to benefit, those who already have power
- China’s rise as a regional power block, politically, economically, and in terms of STI development
- The trend towards ‘electoral politics’
- In Africa, the growth in unemployment rates, which are compounded by the continent’s economic fragility
- The failure of African leaders to self-direct, preferring instead to take the ‘easy option’ and be directed by outside/third parties
- The difficulties surrounding knowledge-generation and development within the continent’s individual nations
- Africa’s potential strength as a unified continent, i.e., one that identifies and implements systems to enable African countries to work collectively.

Venâncio Massingue, Mozambique’s Minister for Science and Technology was the last to present during this session. His presentation looked at the role of Science, Technology & Innovation and ICT in Mozambique’s social and economic development.

After providing the floor with a comprehensive breakdown of Mozambique’s current socio-economic indicators and telecommunications infrastructure, which will be providing voice, data and image signals in 128 districts by 2008 and is in the process of implementing a broadband network, Massingue turned to a regional initiative – EASSy (East and Southern African Submarine Cable System). This will see the construction of a 9000-km sub-marine cable that will not only link up 23 African countries, coastal and land-locked, but will also connect to other global sub-marine systems with the aim of dramatically reducing international connectivity costs.

The Government of Mozambique has been quick to recognize Science & Technology as a primary productive force, especially in the areas of poverty reduction and economic growth, and has put into place a five-year plan (2005-2009) with three branches specifically for Science and Technology:

- Scientific Research
- Technology Transfer & Innovation
- Information & Communication Technology (ICT).

Turning to discussing the present state of S&T in Mozambique, Massingue pointed out aims and achievements in strategic planning, capacity-building, the establishment of thematic Scientific Councils and an Academy of Science, various district-level scientific expeditions and the creation of three Regional Centres for Science and Technology. With regard to the latter, Massingue elaborated upon the objectives, competencies and programmes/projects being implemented before moving on to discuss five ICT Strategy Projects: e-Government – anchor projects, two different Access for All initiatives, MoRENNet, and the Human Resources Development MICTI Model.

The challenges to achieving the above are many, said Massingue. Those he had time to mention were:
• Promoting partnerships with industry to encourage the retrieval of valuable research
• Establishing scholarship schemes for MSc, PhD and post-Doctoral development activities
• Developing indicators to evaluate the impact and achievements of S&T.

**Points of discussion:**

**Eric Osiakwan to the panel:** How can we integrate entrepreneurs who do not have academic backgrounds?

Panel response: Universities should provide opportunities for these people, they are the legacy of apartheid. Universities must value them.

**Bruno Kilunga Kubata:** How can we instill a culture of S&T at K-12? Should it start at primary and/or secondary level, or should we be looking at the Japanese example?

**Ndebele to Kubata:** No-one would disagree that such a culture does need to be developed – the difficulty lies in limiting choices in a strategic manner.

**Massingue to Kubata:** One solution is to make TV and radio programmes to give young people a knowledge base.

**Shahab Meshki:** How do we collaborate with the private sector?

**Sawyerr to Meshki:** We are university leaders, hard-line academics, but unless the quality of our contribution to society and development is strengthened, most of what we do (and the resources/funds with which we do it) is wasted.

**Massingue to Meshki:** In the US, the private sector is different. In Mozambique the private sector is in its infancy and still driven by incentives.

**Denis Simon to Massingue,** in reference to the OECD and definitions of ‘a scientist’ and the Asia-Pacific model that is without such definitions: do we have the beginnings of a system whereby data can be looked at with greater comparability?

**Massingue to Simon:** If we want to be taken seriously, we must use an internationally accepted set of indicators to show the impact of S&T.
Session 2: Harnessing ICT as a Driver of Economic & Social Development
– Cutting Edge Perspectives

Chair: C. N. B. Tagoe, Vice-Chancellor of the University of Ghana

Panelists:
Michael Best, Professor, Georgia Institute of Technology/MIT, US
Neerja Raman, Fellow, Stanford University, US; Former Director of Research, HP Labs
Strive Masiyiwa, Founder and CEO, Econet Wireless, Zimbabwe
Uday B. Desai, Professor, Indian Institute of Technology – Mumbai

In this session, speakers provided global and African perspectives on ICT applications in areas such as agriculture, public health, population, engineering, finance, and the environment — especially for the poor. These included ICT uses such as telemedicine, cellular technology, remote sensing/GIS, analysis of clinical test and epidemiological data, data access and genomics.

The presentations from these four panelists allowed the floor an insight into the various ways in which ICT is, can be and has been used, cheaply and effectively, to further development and/or alleviate national and/or local socio-economic problems.

Michael Best’s presentation looked at the progress of scholarship on information and communication technology for development (ICT4D). The historical trajectory of ICT for Development has gone from being descriptive in the 1980s to a discourse of success stories in the 1990s, followed by one of self-reflection and doubt regarding its impact on economic development. Now it is in what can be described as a synthetic period, i.e. one founded in theory, common concepts, empirical analysis and far more holistic in terms of technologies, policies, business models and human capacities.

He then presented a ‘roadmap’ for some cutting-edge technologies that prescribed screens, power systems, terrestrial wireless networking, spectrum exemptions and micro-operators. The requirements for, and conditions of, each of these ‘components’ was then examined.

In brief, the current challenges of dependence on unreliable electricity and telecom grids must be met through innovative technologies that do not require standard power sources or communication routes. Best stated that i) displays needed to be ultra-low in terms of their power consumption and ii) power systems had to rely on cheap and/or locally-produced sources of power – e.g. micro fuel cells and harnessing solar power. The myriad forms of terrestrial wireless communication – past, present and future – must become more integrated and provide, for example, more support for flexible and dynamic spectrum and interference management (including software defined radios), authorization, and accounting protocols.

With regard to the issue of spectrum exemptions and global in-country licensing of 2.4 and 2.5 GHz broadcast restrictions, both by region and economic level of development, Best demonstrated that countries that allow unlicensed use of 2.4 or 5 GHz bands have higher levels of Internet use even when we control for a country’s size, region, and level of economic development. However, one third of the world’s countries do not allow regulated Wi-Fi use. Most of these countries are African.

In relation to sustainable international development and enhancing consumer welfare, Best ended his presentation by pointing out that micro-operators (SMEs) must look at providing
rather than simply using ICT, citing a pro-poor case study revolving around the use and overwhelmingly positive socio-economic impact (agriculture, access to e-government, entertainment) of rural tele-kiosks in India. Thriving environments for SMEs must also be created.

Neerja Raman was next to speak. Her presentation explored the ways in which ICT can be, and has already been, used to transform the shape of developing economies, building an intellectually, politically, and economically vital middle-class and raising ordinary daily take-home pay to above US$2.

Her presentation looked at the role universities have to play in enabling national development, namely by accepting and embracing ICT as well as the fact that the way information is disseminated has changed from printed to online (rich) media and applications. Not only are these integral to modern daily life, they are also (or can be) affordable, accessible and lead to new ways of generating income.

Raman made use of two different case studies from India to illustrate ICT in innovation and the use of ICT in public health.

**Case study – Innovation:**

The 3Ts (Technology, Tools, Training) Digital Equalizer Programme (see [http://www.aifoundation.org](http://www.aifoundation.org)) has been widely and successfully implemented in the Punjab, India. Through this programme, young learners (and their teachers) are familiarized with computer basics, popular productivity tools (MS Office, Open Office etc), using the internet for research, and using email and other digital technologies to help create rich, multimedia content, thus fostering an ICT-savvy populace.

**Case study – Public Health:**

In parts of India, ICT is being used for the live surveillance, reporting and management of communicable diseases. Using ‘simple’ technologies such as GPS by field-workers has significantly reduced the burden of healthcare management through its speed, accuracy, and ability to partner private sector interests (pharmaceuticals, hospitals, research centres) with those of government (see [http://rdvp.org/fellows/2006-2007/shashank-garg](http://rdvp.org/fellows/2006-2007/shashank-garg)), leading to the availability of knowledge-on-demand.

Raman concluded by stressing the importance of the sustainability factor. In quoting Adam Smith - ‘It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest’ - Raman reiterated how social and economic progress becomes possible when individuals are empowered.

Strive Masiyiwa’s presentation reflected upon the trials and tribulations involved in starting up an ICT-dependent business – Econet Wireless – within a predominantly unsympathetic political environment. At Econet’s ‘birth’, the government of Zimbabwe had yet to recognize the contemporary value of ICT to its populace and Masiyiwa had to battle for five years to obtain a permanent license to operate.

The members of this forum represented a new audience for him, Masiyiwa said, one that may be unaware of the fact that Econet Wireless, a telecommunications company started in Zimbabwe, now has offices and exchange portals all round the world.

In addition to providing mobile cellular communication to thousands of Zimbabwean consumers, Econet Wireless also offers internet services, satellite communication and fixed public networks. It also has roaming agreements with a number of international partners.
Currently, it is the third largest router of African traffic. Moreover, Econet is a prime example of African empowerment — it is the only Pan-African communications group started and owned by Africans. Within (and outside) Zimbabwe, it remains a pioneering force in terms of the services it provides its clients.

In relation to ICT and Africa, Masiyiwa felt that Econet’s genesis and evolution revealed several ongoing areas of national (continental) weakness, namely that:

- African policy-makers do not consider science and technology a priority
- There is little understanding of its economic and social impact.
- Literacy precedes numeracy.
- Regulation is for control rather than development.
- Not only are African governments suspicious of S&T, but there is also a deep mistrust of entrepreneurs.
- Skills development in the sector is almost non-existent.

The wealth of any nation is not in the ground, he said, but in the minds of its people. In order to capitalize on this, Masiyiwa recommended that African leaders need to:

- Have a much clearer vision of and belief in the necessity of a technology-driven society.
- Embrace the benefits of S&T.
- Formulate careful policies to develop a competitive enterprise society.
- Broaden technology skills development.
- Broaden the movement of skilled people across the continent — currently it is easier for an African employer to hire a candidate from Eastern Europe than from another African country.
- Encourage immigration of skilled people into Africa.

But above all, Africans must first learn to work together before looking to outsiders.

Uday Desai, this session’s final panelist, demonstrated to the floor some of the many ways in which ICT has penetrated India, a nation wherein general access to ICT is near-comparable to that of Africa. To him, the roll-out of ICT in India could be used as a model for ICT development in Africa, despite their seemingly different profiles.

Indian GDP has shown a growth rate of nearly 8% for the past 5 years and the growth rate is expected to continue for the next 5 to 10 years. ICT is expected to contribute 4.5 to 4.8% of GDP in the fiscal year 2006-2007. Computer and Internet penetration in India and Africa is almost comparable, while the number of Internet users in India is almost twice that in Africa. Cellular penetration and users are much higher in Africa. Technology and increased numeracy has spilled over into the financial sector, where there are initiatives to monetize villages through ATMs, and enable alternatives for fair loans and enable rural trade.

Key reasons for ICT diffusion in India include emphasis on education, English proficiency and liberalization of the economy in 1991 by Dr. Manmohan Singh, then Finance minister and present prime minister. With the liberation of the economy in 1991, interaction between business and academia flourished, providing a solid platform for commercial entrepreneurial projects.

The Indian Institutes of Technology (IITs) were established beginning soon after India’s independence, using MIT as the model. This commitment to higher education was made at a
time when India’s economic and development problems were much greater than they are today, and are a great testimony to the vision of India’s first Prime Minister, Pandit Jawaharlal Nehru. IITs now also function as business incubators.

The Internet is ubiquitous on all educational campuses. VSAT based distance education is strongly increasing. Both the government and private sector have laid down extensive fibre in urban and rural areas.

India was also quick to harness the power of the Internet by establishing a national ERN in 1986. Today, ERNET is just one of several country-wide networks that provide state-of-the-art communication infrastructure and services to academic and research institutions, government organizations, NGOs, private sector R&D organizations, and various other non-commercial organizations.

Fibre has also been deployed extensively in India – fibre-to-curb is easily available in many metro areas and initiatives have been taken to extend and consolidate its range to rural areas, enabling the provision of numerous services and public initiatives such as rural banking, e-governance and literacy projects, and low-cost patient monitoring.

The costs of developing and implementing the above were lowered by encouraging competition, ensuring deregulation, attracting foreign investments and government providing initial subsidies.

**Opportunities for universities based on India’s experience**

- Keep a long-term vision and investment; The Indian Institutes of Technology did not produce dividends until 40 years later.
- Don’t worry about brain drain, which is now referred to as brain bank in India. Train the young, let them go, and they will come back bringing in a value system that is global.
- VSAT based distance education is a growing trend. IIT Bombay has 14 colleges and Aminata University has 42 universities on their VSAT distance education link.
- Organize universities around Education and Research Networks.
  - ERNET established in 1986, Intranet and Internet for Agriculture
  - EDUSAT is the first Indian satellite for serving the educational sector
- Partner with industry. Both IITs and industry are anxious to partner and leverage each others’ expertise. For every 1 rupee the IIT gets from the government, it earns 4 rupees in consulting and other fees.
- Strong belief in technology entrepreneurship is a driver
- Improving the curriculum with training programs that cater to needs of industry, bringing the private sector on campus to talk, and projects implemented in partnership with industry have been key.

**Panel Summary – Opportunities for universities:**

- Increase their lobbying with policy-makers (Finance, ICT, S&T, Education Ministers)
- Foster a paradigm shift, increasing emphasis on numeracy to sharpen the technical skills pool
- Bring industry participation into the curricula.
Points of discussion:

Masiyiwa, in answer to a question as to why the best talent is not always to be found ‘at home’: in Africa, we need to break down various barriers to ICT development, including certain immigration issues. For example, Econet put out an advert for engineers and received 1500 applications from Nigerians living in the Diaspora who were willing to take a salary cut in order to come home to work for a company that offered job security once they had completed their training.

Best, on the route to ICT development in Africa: we need to take a holistic approach, promoting and scaling-up appropriate technologies. We also need to ensure that there is appropriately robust primary, secondary and tertiary education. Finally, though it may seem radical, universities need to work with the private sector, especially countries such as Rwanda, whose ICT sector was largely destroyed during its internal conflict.
Session 3: The University as an Engine of Innovation  
– African & Global Perspectives

Chair: Professor Malegapuru W. Makgoba, Vice-Chancellor of the University of KwaZulu-Natal

Panelists:
Calestous Juma, Professor, Harvard University (by video), US
Peter Materu, Senior Education Specialist, World Bank
Jesus del Alamo, Professor, MIT, US

The expansion and upgrading of higher education has been a key enabler of rapid economic and social progress in the newly developed and emerging economies of Asia such as Korea, India, and China. In developed countries, universities play an important role in regional and national economies as sources of human capital, creators of knowledge, and institutional facilitators of new ventures and collaborations. This session explored broad visions for universities as engines of innovation as well as the changes needed to realize these visions in an African context.

Calestous Juma delivered his presentation by video. His presentation focused on the ways in which universities can be brought to bear on African development, through ICT in particular.

There is, he said, a new development narrative at work in Africa, wherein African leaders are now looking at ways in which technological innovations can be used to foster continuous progress at all levels. African leaders have, he said, moved on from the time when their first assumptions about ICT were overwhelmingly negative, i.e., that ICT had potentially damaging consequences. Now, their first glance looks at reaping the benefits ICT may have to offer, particularly in terms of redressing national social/economic problems.

At this point, Juma pointed out that it is important that ICT be seen as more than just an assortment of physical devices; ICT must rather be seen as a platform for improving performance, i.e., a generic and pervasive set of tools for improving social and economic welfare.

It is in this realm that the relevance of universities comes to the fore. If ICT is to become a driving developmental force, then universities need to develop programmes that incorporate its use or teach its applications within individual disciplines. This can be done in two ways:

1. By ensuring a convergence of ICT with traditional sectors – using ICT to enhance and upgrade productivity without replacing the human component
2. By using (and teaching) ICT to create new industries and economic sectors, for example internet-based business.

Juma then pointed out that most African universities find it difficult to accommodate the teaching of ICT when it involves new programmes or new uses. Often this is due to university structures, which are slow to embrace change and/or draw up new policies relating to function and output. The obstacles universities face when it comes to thinking/working innovatively and promoting change are usually linked to the fact that they were established to support the public rather than the private sector. However, today it is the private sector that is driving (and
funding) developments in S&T. In order for universities to not only survive, but flourish, they must find ways of engaging with the public sector.

For this to happen, universities in Africa must be seen to be:

- Meeting and serving society’s basic needs (agriculture, public health, social concerns)
- Participating effectively in the global economy
- Effectively managing their environment

For this to take place, several reforms must be made, including:

- Access to telecommunications infrastructure must be vastly improved for all universities
- Universities must learn how to effectively utilize ICT
- University curricula must be brought into line with private sector needs, becoming more flexible in order to meet national/regional requirements
- Ways of teaching must be reworked, promoting practical skills rather than purely emphasizing the absorption of fact
- Universities must begin to specialize, selecting students that offer the right talents/aptitudes

In turn, this requires not inconsiderable reform in government policy, which must take on board the fact that universities are engines of economic development, not rarefied and self-serving institutions.

Juma brought his presentation to a close by expressing the hope that this conference will work out ways of addressing some of these issues.

Peter Materu chose to discuss some issues concerning tertiary education as an engine for growth in Africa, breaking down his analysis into the following sections: the global context; the African context; main messages; unlocking the potential for tertiary education in Africa; issues for further consideration; and the World Bank’s higher education activities.

The world, he said, is becoming increasingly linked and networked, leading to greater global consensus. However, despite various recommendations and studies (Commission for Africa 2005, NEPAD’s HD strategy, the African Union’s 2nd Decade of Education in Africa) public spending on higher education in Africa is declining, due to its inefficiency and to higher social spending. This in turn limits Africa’s ICT capacity and connectivity.

Turning to his main messages and ways of unlocking the potential of tertiary education in Africa, Materu stated that:

1. Tertiary education is critical for growth in a knowledge economy.
2. ICTs are indispensable – we live in an interconnected world.
3. Staffing is a major constraint – what can we do to retain and motivate staff?
4. There is a need for creative ways to use the talents held by the African Diaspora
5. Interest in S&T among young boys and girls is falling in most countries – how do we revive this?
6. The quality and relevance of a university education is a rising challenge – ICT must be integrated into teaching and learning, it must become more closely linked to the labour market, trade strategies and investment priorities, increasing the focus on key skills required, it must foster dialogue on national policy. More students also need to actually graduate.
7. We must tap ICTs potential by forming bandwidth consortiums, increasing ICT literacy, forming Open Source content partnerships, working out how to support the development of digital literacy for those of lower educational levels and learning from promising strategies used in other countries/regions.

8. Universities need to adopt innovative financing strategies, experimenting with new approaches and making the case for increased public funding of TE.

Materu concluded by detailing some of the World Bank’s ongoing activities in higher education in 14 Africa countries.

Jesus del Alamo rounded off this session with a presentation focused on iLabs, i.e. real laboratories with high-end, up-to-date equipment that can be accessed through the internet, from anywhere in the world and at any time.

In demonstrating how iLab usage tends to peak the night before an assignment is due, del Alamo showed just how important it is that the operating system is able to handle peak demand, given that these facilities should be shared rather than first-come first-served. Since 1998, he said, over 4500 students have accessed (for course credits) the iLabs at MIT.

The main benefit of iLabs is that their unique locations enable them to provide the services of state-of-the-art equipment at a very reasonable cost. Students who have the available bandwidth at their disposal no longer have to rely on access to (out-dated) labs in their immediate vicinity and are able to share their findings with a truly global student community.

The challenges African and other iLab users in the developing world face are principally related to their own ICT infrastructure. Namely, these are:

- Limited access to networked computers and educational software tools
- Limited appreciation of the versatility of computers
- Severe bandwidth limitations – for example, Makerere University, Uganda, has a bandwidth limit of 2Gb/s (it also relies on a satellite gateway to the internet), whereas MIT’s is 8Gb/s
- The limited reach of optical fibre systems

Given the above, what are the consequences for iLabs? Del Alamo’s conclusion is that iLabs need to deploy educational resources on a more geographically local level – i.e. recognizing that solutions engineered in the developed world are not always effective when it comes to breaching the digital divide. They also need to engage developing countries in innovation, experimentation and modification in educational technology. Additional local servers delivering applets and storing results locally also need to be established (Servers have already been installed at OAU, Nigeria; MUK, Uganda and UDSM, Tanzania).

Del Alamo went on to look at the breadth of MIT’s Open Course Ware (OCW). OCW consists of freely-available web-based publications of MIT course content, the bulk of which is accessed from within the US (43%) and from China (21%). Sub-Saharan Africa counts for only 1% of all visits since 2003.

In conclusion, del Alamo stated that new educational technologies could be effective in and for the developing world in terms of bringing curricula up-to-date and meeting new educational needs. Bandwidth and other technical limitations can be overcome, he said, by using innovative technologies, but only if the developing world is actively involved in their development. Long-term challenges revolve around ensuring the widespread dissemination of ICT among developing countries, achieving long-term sustainability, and transforming Africa from being a consumer to a creator of ICT and its content.
Points of discussion:

Comments: General comments included the following points: We need to challenge the assumption that Africa will be forever deprived of bandwidth, we should not accept that bandwidth limitations are inevitable. Tools need to be fast, we need to store as much as possible locally. Are iLabs sustainable? Everyone agrees on the involvement of the private sector and the Internet – the question is, how is this to be done?

Baryamureeba: The issue is not bandwidth alone, it is also one of language – there will be many users who cannot access information if it is only recorded in English.

Del Alamo to Baryamureeba: English is not the only option; there is a network of Portuguese and Spanish speakers who are involved in translating courseware, for example.

Materu: There is a disconnection in dialogue between education and S&T dialogue and between ministries of finance and education. We are looking at ways of bridging this gap. Admittedly, we could be doing more.

Phillip Griffiths: Having worked with the World Bank, I agree that country directors as well as scientists can bring this issue to the table at S&T forums; it is an opportunity to develop support for S&T. The World Bank is now engaging stakeholders.

Alice Lamptey: As regards furthering the development of ICT in Africa, there is clearly a major role to be played by ministers and Heads of State.
Session 4: Vice Chancellors’ Roundtable on University Roles in Meeting Aspirations for ICT & Economic Development

Chair: Professor Njabulo S. Ndebele, Chair, Association of African Universities Vice-Chancellor and Principal, University of Cape Town

During this session, the group reflected on the experiences and aspirations of their own institutions, asking where the high-leverage opportunities for universities to make a positive impact are to be found. In addition, they discussed the key opportunities and challenges facing their respective universities over the next decade, and how can they best contribute through the use of ICT to the objectives of economic and social development in sub-Saharan Africa.

Themes discussed included:

- Open and distance-learning programmes
- Constraints – infrastructure, bandwidth, staff retention, computer illiteracy, language, restrictive regulatory frameworks, political instability
- Opportunities within universities – local content development, distance education programmes, telemedicine, administration systems (finance, HR, student records), library automation, incubation centers, and policy development.
- Opportunities for engaging government in innovative ways
- The issues of funding for ICT.

Ghana – University of Ghana – C. N. B. Tagoe

For the past 18 years the country has been politically very stable, a factor which has allowed it to become a darling of the developed world. Now, the University of Ghana has been asked to generate 30% of its budget. As a way of addressing this, it has introduced a number of cost-sharing initiatives. For example, some residential fees are used to meet 15% of its ICT expenses. In addition, it has created a staff development learning and resource centre for both academic and administrative staff. Corporate enterprises are also involved in the running and development of its computer labs, which ensures a certain degree of continual quality. And, in support of higher education, the Government of Ghana has introduced a new tax levy, of which a percentage goes to the Ghana Education Trust Fund (GET). In recognition of its self-driven advances, the university has just received US$5m for infrastructure development.

Kenya – Moi University – David K. Some

Moi University has developed innovative private sector partnerships. We have also commercialized research and development (R&D), and, for example, have won a contract with a sugar company to train staff on ICT. Other initiatives undertaken include reaching out to community: medical students now spend 12 months working in rural areas; law students provide free law clinics; through the Ford Foundation, students of agriculture work together with 6,000 farmers.

Uganda – Makerere University – Livingstone S. Luboobi

Makerere face the following key challenges:

- Insufficient infrastructure
- Limited bandwidth
- Retaining staff
• Computer illiteracy
• Restrictive regulatory frameworks
• Political instability

In order to address the above, it has implemented a number of ‘reforms’:
• HR development, investing in human capital
• Set up partnerships with the private sector, allowing the university to engage in business
• Set up incubation centres for the development of SMEs
• Reworked its policy in the direction of ICT

South Africa – Njabulo Ndebele

We need to look at ways to start negotiating with the private sector. Moreover, our relationship with government can be two-way and mutually beneficial. There are five key points:

1. The last major public investment in higher education in Africa was in the late 1950s and 1960s.
2. Deregulation has been slow
3. High-level staff has had to be trained and/or re-trained.

Key to higher education, ICT and the future are:
4. Partnerships between institutions of higher education, the private and the public sector
5. The curriculum must be completely revised, i.e., in terms of teaching, learning and policy.

General consensus was that the AU meeting on S&T in February would be a useful forum at which VCs could engage policy-makers.
This session focused on the skill sets needed by African and global employers, and how these are likely to evolve in the coming years. It also looked at the strengths and weaknesses of African graduates as seen through the eyes of employers.

Denis Fred Simon opened this session with a presentation focused on some key issues and challenges relating to the evolving pool of global talent.

In terms of global competition in the 21st century, the key words are fluidity, turbulence, innovation and speed. It is also important to keep up – catching up and being behind is becoming ever more expensive, he said. Africa must have an attractive talent pool if it is to avoid future marginalisation, it must be part of the global ‘army’ of skilled, mobile workers.

So doing requires a different developmental approach, i.e., the WEF Davos transformation ‘model’. Its ‘new’ components stress the importance of:

- Innovation, creativity & design strategies
- Cost and quality being integrated with innovation
- Workshops that look at ways of:
  - building a culture of innovation
  - making innovation real
- Outsourcing innovation
- Developing intellectual property and other intangible assets

Above all, it is human resources that need to be developed: human talent is the route to sustainability, Simon said.

He then turned to core issues surrounding the concept of the global talent pool, looking at some of its features, some of its drivers, and posing the following questions:

- Is there really a global talent pool?
- How is the globalization of talent tied to key international issues?
- What challenges are associated with creating and maintaining an “attractive” pool of talent?
- What are the keys to realizing value from a talent pool?
- What are the barriers to a truly global talent pool?
- How much mobility is too much?

Turning next to the new world economic order, Simon defined some of its main characteristics and outlined the ramifications for (African) development. He cited General Electric (GE) as an example, showing the floor how managerial and production networks
have changed, how they rely on ICT as a driver, and how decentralized and more collaborative and/or cooperative many corporations have become. The corporate model of the 20\textsuperscript{th} century – essentially hierarchical and isolated – is disintegrating, Simon stated.

Putting this into geographical context, Simon reflected on the circumstances surrounding China’s rapid rise to economic power; how it is now the world’s third biggest spender on R&D; and the changes this nation has undergone in recognition of the fact that ‘independent innovative capability (zizhu chuangxin) is the core of national competitiveness’.

China has also embraced the software revolution, the intensification of competition, the need for simultaneity, and the speed of innovation – other factors that are central to developing global talent.

Also vital to the latter, he said, are the six Cs: capabilities expansion; capacity enlargement; creativity enhancement; cost abatement; the capture & retention of talent; and being coordinated across time and space.

Simon then brought his presentation to a close by briefly looking at various barriers to developing global talent as well as those core skills needed for cross-border and cross-culture management.

Neil Butcher then examined a number of issues concerning the preparation of Africa’s graduates to drive economic growth. After his introductory caveat that stipulated ubiquitous broadband access for students, an Africa in which any future is possible and ICT as a social phenomenon, Butcher looked at some of the shifts that are needed in terms of academic/university foci and thinking if these bodies are to provide graduates with the skills sets required by African and global employers.

He looked at the implications of the current disconnections between public spending in and on Africa and the continent’s economic development, stating that African universities need to look at producing a new generation of people who will drive economic development that is ‘of the people, by the people, for the people’ both in the immediate and distant future.

Butcher discussed some of the essential, basic skills that this generation of economic leaders will need, namely the clear ability to manipulate the three Rs in the modern, digital context. These people will also need to be fluent in the more advanced skills of expert thinking and complex communication. They will also need to be able to think and act creatively. Butcher pointed out that this talent – which is vital for the development of ‘niche roles for African economies … [and for] innovative solutions that the scale of our developmental problems demand’ – is seldom actively fostered in African systems of education.

Lastly, he turned to ICT and the changing role of educators, i.e. the pressing need for them to:
1. Foster coherence and discipline in thinking.
2. Teach students how to safely navigate the ethics of a world with no apparent limits.
3. Teach students how to cope with the challenges of ‘unlimited’ choice.
4. Encouraging learners to become creators in the educational environment.
5. Enable students to cope with increasing choice effectively and responsibly, to remain decisive and always able to act.
6. Provide students with the competence to become creators and sharers of knowledge, especially in relation to online communities of practice.
In facilitating the above, African higher education institutions and its graduates will be instrumental in harnessing the abundance and richness of potential that lies in Africa’s people, finally breaking the continent’s cycles of poverty, Butcher concluded.

Nick Binedell’s presentation focused on how to manage institutions of learning in terms of the ‘new agenda’ for ICT. Currently, universities are isolated from modern economic development. To rectify this, traditional perspectives on learning need to be abandoned and/or updated.

Re-emphasizing what has already been proposed by previous speakers, Binedell said that Africa needs to attract the economic attention of the African Diaspora, and ensure that its universities produce graduates that are central to its future economic development. Africa needs to look to the Asian models, e.g. Singapore, where the university and its graduates are the economy. They need to recognize that the Western way of doing things is not the only way; in fact it has many limitations for Africa. Ways of doing things in the Far East, China and India have much to offer Africa. Binedell ‘explained’ this through a suite of visuals illustrating the ways in which these nations, each with their own set of profound societal problems, are racing ahead with developing and further applied knowledge and ICT and thus building for themselves solid economic futures.

Returning to positive change, ICT and the university, Binedell believes that they need to become more effective in terms of their speed of delivery, they also need to make more, and more effective, partnerships with the economy and with politics. In short, universities need to redefine and rebuild themselves as factors of production, producing a more functional type of elite that is academically and intellectually creative and inventive.

Shahab Meshki, an appropriate closing speaker for this session spoke about how Cisco has been developing human capital in ICT through its Networking Academy’s Programme.

He began by establishing a few relevant issues: the changing role of ICT and the convergence of technology, the fact that there is a skills gap; Africa’s lack of national initiative as regards building capacity in ICT; and that educational focus on ICT only starts at tertiary and not junior and/or secondary level.

He then underlined the social and economic importance of both networks and the internet to the workings of contemporary society, whose increasing sophistication requires an ever-increasing number of more highly-skilled workers in and of ICT.

Meshki then briefly listed the ‘dangers’ revealed by the 2006 IDC MEA Skills Gap Study, which covered 9 countries in the Middle East as well as Pakistan and South Africa. He also touched on some of the ramifications for national development in South Africa.

How does Cisco’s Networking Academy address those issues, he asked. Using a number of case studies and sets of statistics, Meshki showed how large the global impact of its flexible training programmes have been in terms of:

- Curriculum donation
- Cost-recovery training
- Providing discounted equipment
- Creating virtual communities
- Accredited training in soft skills
- Accredited employability services.
Primarily this is because of its modern course structure, which provides a standards-based curriculum; embedded assessment and accountability; e-learning; hands-on labs; face-to-face instruction; critical, problem solving and collaborative thinking; and a skills- and outcome-oriented approach.

As an illustration of the above, Meshki expanded on Cisco’s involvement in, and achievements at, Makerere University, Uganda.

He closed with a ‘call to action’, urging greater commitment to public-private partnership, taking on ownership and responsibility; ensuring better integration of ICT current university and high-school curricula. ‘Let’s make a commitment out of this conference to graduate 100,000 ICT workers in 12 months’ time!’ he ended.

**Points of discussion:**

**Osiakwan:** We need to do more than catch up or build enough human intellectual capacity – we need to be competitive, we need to have a core niche for our computer scientists.

**Eve Gray to Binedell:** There is also the question of the ethos of universities and collaborative non-proprietary ways of working. How are we to relate this to IP? To what extent are African universities grappling with new issues of IP? We need to welcome collaborative networking.

**Binedell:** An incubation period is required, but we do need to carry out ‘smart’ experiments, free up budgets to ‘play’, get away from planning and into doing. Making ‘smart’ mistakes is the best way to learn.

When it comes to faculty, students and staff will all be part of it, they will be active at the cutting edge rather than only publishing once or twice a year.

Universities must become part of the political and financial economy.

**Simon:** Tolerance of failure is critical, it is not a bad thing. It is how entrepreneurs learn, how they work, look at America, look at Fortune’s 500. We must be training students for the 21st century not the 20th. Look at games and gaming; today’s students and young scholars learn differently. Gaming must become a pedagogical tool, we must re-present information and acknowledge and embrace the new ways that knowledge is absorbed. Africa must embrace this fully, it must take risks!

**Unknown:** We must be training for the future, not for the present. This is the problem that universities that were set up a long time ago are now facing; they also have too much red tape to deal with. This being so, how are we to implement with speed and so produce job-creators not job-seekers?

**Ndebele:** This is the paradox – to speed up you have to get into a speedy system …

**Butcher:** In terms of speed, we need to look to long-term not short-term requirements. We need to address the new cognitive demands of graduates in the modern world. Speed comes in many different forms; it is not just a question of responding all the time, but being more flexible and changing our structures.

**Desai:** What are the impediments in Africa? If we identify them, we can move forward.

**Lishan Adam:** The key challenge is creating a road-map for professors and students to fast-track this process.
Anamuah-Mensah to Meshki: What about the horizontal curriculum, how could this be useful to the community? What about quality assurance as regards programs for delivery and training?

Meshki: Students of Cisco programmes are very rigorously tested.
This session explored new programs and curricula being developed by universities to meet the needs of employers in Africa and around the world. It drew out conclusions about what works and what approaches could and should be emulated.

Dick Ng’ambi turned to question why it is that today’s employers consult little with higher education institutions (HEI) when it comes to matters of training and training content. Time is a factor: the time it takes currently takes to accredit a course (+/- 3yrs) must be dramatically reduced, especially in the field of ICT, where innovations are made on a daily basis.

Moreover, this century’s graduates need to be equipped with additional but essential skills – inventive thinking, high-productivity, effective communication, digital-age literacy – required for innovative jobs. The question is, how are universities in Africa going to provide them? Quoting the US Department of Labor, he said, ‘We are living in a new economy – powered by technology, fueled by information, and driven by knowledge. The influence of technology will go beyond new equipment and faster communications, as work and skills will be redefined and reorganized.’

Ng’ambi then spoke about his work in this regard, which revolves around ways of making real-world tools – i.e. those that are already in the public domain – more effective when it comes to addressing new ways of learning, mobile learning in particular. Based on the technology that can be used by mobile phones, Ng’ambi has set up a mobile ‘vortal’, which allows authorized students – the central resource – to communicate via SMS about their coursework and/or other academic concerns on a one-to-one, one-to-all, student-to-mentor and mentor-to-student basis and anywhere at any time.

This type of e-learning communication can be anonymous or acknowledged; responses can also be emailed back to the sender, and the chain of correspondence viewed on the internet. Through this programme at UCT, the cellphone (by far the most common ICT device in Africa) has become a dynamic tool and has shown its student (and staff) users valuable alternatives for exchanging ideas and information, and useful ways of ‘saving time’. It is providing real-time opportunities to develop the requisite 21st century skills and proficiencies in social and ICT networking.

Venansius Baryamureeba presented a paper entitled On New Curricula for Creating Human Capital Needed for ICT-led Economic Growth: The Case of Faculty of Computing & IT, Makerere University, Uganda. It focused on the new programs and curricula being developed by Makerere University in the area of Computing and ICT to meet the needs of employers in Africa and around the world. (Baryamureeba distributed a full copy of his paper to each member of the floor.)

Baryamureeba introduced his paper by stating that ‘for any meaningful development to take place or be sustained in any country a critical mass of Science and Technology (S&T) human capital is mandatory. This is the case in countries like China, India, and Finland. For example,
in 2005 China increased S&T expenditure by 25% compared to 2004; at the same time R&D expenditure alone grew by 20% and the R&D workforce surpassed a million. Also in 2005 China had 1200 Institutes of Technology, 53 High-Tech parks. S&T human capital is a prerequisite for the attainment of the Millennium Development Goals (MDGs).

He then turned to the make-up of the ever-growing Faculty of Computing and IT at Makerere University, examining its vision and mission of being a first-class African leader in Computing & ICT training, research and consultancy services.

Current programmes and curricula under the Departments of Computer Science; Information Technology; Information Systems; Networks; Short Courses (1-8 months’ duration’); and the more-recently formed Department of Software Development & Innovations – all of which meet international standards – were then outlined. (Makerere University also offers a doctoral programme in Computing.)

Each of the above not only addresses (where possible) pertinent private sector needs but also provides its graduates with a valuable set of skills. Unlike more traditionally-run universities, the various curricula have also been designed to:

- Raise the profile and strengthen the position of Faculties/Schools of Computing in Africa
- Ensure the cross-fertilization of computing/ICT programmes within the university – MA and PhD students working together on collaborative projects, for example
- Take a multi-disciplinary approach, which will drive the ICT sector forward
- Produce internationally-acceptable graduates
- Redress the gender imbalance in computing & ICT
- Seek the involvement of the African Diaspora
- Produce a critical mass of ICT professionals that will positively impact on Uganda’s and Africa’s socio-economic development
- Sensitize the academic world to the irrefutable relevance of ICT & computing
- Enable the running of a high-level post-graduate programme in a resource-constrained environment.

The Faculty of Computing and IT has implemented the following strategies to boost the impact of its post-graduate programmes:

1. Organizing an Annual International Conference on Computing and ICT Research (which then functions as a source of funds with which to attract professionals to work with students).
3. Establishing a Programme for Visiting Scholars and Professionals from the African Diaspora.

Jakita Owensby gave a presentation on Services Sciences, Management, and Engineering (SSME) on behalf of the team at Almaden Services Research, a part of IBM. In it she looked at motivations for SSME; exactly what is meant by ‘Services’; and academic initiatives.

In relation to the first point Owensby looked at the global rise of the service economy and pointed out that:

- Economic growth depends on innovation – nationally and in the enterprise
- Currently, the US labour force and GDP is more than 75% services-based – developing nations are close behind
• Although the world is becoming a giant service system, composed of six billion people, millions of businesses, and millions of technology products connected into service networks, services innovation is not well understood.
• There must be an urgent call to action to become more systematic about service innovation
• Service innovation is important to governments, businesses, and academics, but exactly how important is it?

Given the changing character of the global economy, the 21st century needs uniquely-skilled people, she said, which in turn requires:
• Cross-disciplinary programs and degrees (SSME)
• Fusing technical competency with industry specific knowledge and organizational and business-process expertise (depth and breadth)
• Success requires open collaboration among academia, government and industry to transform how the pipeline of future skills is built.

Giving various definitions of ‘services’ and explaining what differentiates a service from a good, Owensby then briefly looked at traditional versus electronic services before further elaborating on SSMEs. In essence, these are:
• An urgent ‘call to action’ for innovation in and to develop a ‘science of services’ that uses theoretical, empirical, analytical, design and engineering frameworks
• A proposed academic multi-discipline that links science, engineering, business and management strategies
• A proposed research area involving IT, linguistics, social and economic systems.

What is IBM’s interest in this? Its ability to innovate has always depended on the ability to find and hire the multidisciplinary talent it needs. IBM is playing a role in establishing SSME for the same reasons – the need for talent to innovate and perform in the arena of complex business services that can transform the capabilities of organizations. To this end, IBM is about to launch an external course on SSMEs. See [http://www.almaden.ibm.com/asr/SSME/coursematerials/](http://www.almaden.ibm.com/asr/SSME/coursematerials/)

Owensby concluded by looking at ways in which developing curricula for ICT services can and has been done in specific ways at different academic institutions in the US.

Points of discussion:

Victor Dugga to Baryamureeba: With 54 PhD students and 5000 undergraduates, how are you managing with staff? How effective do you think you’ll be when it comes to distance-learning?

Baryamureeba to Dugga: We have 31 professional staff for our PhD programme; we are also supported by the Netherlands. 65% of our courses are also available on-line. We have a complex teaching profile and a big pool of faculty resources.

Comment to Ng’ambi on SMS-usage: Are we seeing something like Darwinian evolution when it comes to speed? That the ones who will survive are those who are most responsive?

Ng’ambi: At exam time and off-campus, SMS use is very high. In fact, at all times SMS use off-campus is much higher than on-campus use. Students want to stay in contact with the rest of the class. Admittedly, academic staff is less involved in SMS use – for them we need to create an interface.
Question to Baryamureeba: With regard to your open courses, what is your opinion of software development being Open Source? There will be students from the private sector, NGOs, the community at large? How does what they want impact on this?

Baryamureeba: It very much depends on the profile of a class. Some will want to use Microsoft programs, others not.

Comment from Anamuah-Mensah: Students seem interested in technologies in certain and alternative ways but are not allowed to use them outside the prescribed system. It is important that we capture such interests and applications – above and beyond SMSs – in the classroom in order to liberate learning. We need to learn how students learn.

Owensby, agreeing with the above point, cited the social sciences, which marry the theoretical with practical business concepts: we need to make knowledge more practical.

Ng’ambi: We need to work further with the mobile phone – it really can be a tool for all.
Session 6: Leveraging ICT to Create and Apply New Knowledge, Accelerate Growth, and Meet Other Social Needs in Africa

Chair: Professor Michael Faborode, Vice Chancellor of Obafemi Awolowo University

Panelists:
John Gage, Vice President/Chief Researcher, Sun Microsystems
Bruno Kilungu Kubata, Network Director, BecA
Russel Jones, President, Standing Committee on Capacity-Building, World Federation of Engineering Organizations

This session examined cases of institutions currently leveraging ICT to create and apply knowledge to meet a variety of needs in Africa.

John Gage’s presentation asserted that above all, we all (not just Africa) need ubiquitous access to ICT. However, establishing broadband access for universities in Africa is not enough – also required are conditions of mobility, location, identity, self-organization, ubiquity, resilience, security. Fundamental changes must be made to the way universities view their students, their institutional function and their relation to ICT.

Universities need to become social service providers, meeting the needs of the populations they serve, both in terms of output of information and of suitably-qualified/equipped students. For example, universities need to work towards producing job-creators rather than job-seekers, i.e. addressing and embracing today’s entrepreneurial culture. To this end, John Gage provided numerous lists of university students starting up successful ICT companies in Silicon Valley (Netscape, Microsoft, Google, EBay, etc.) Enabling this is not impossible.

Contrary to popular belief, networking the whole of Africa is not a financially Herculean task. According to Gage’s calculations using GoogleEarth, the cost of so doing – and with unlimited bandwidth – would be around a mere US$1000 per kilometer. If broken down to a per capita contribution, this cost becomes almost negligible. Moreover, there are already 700 kilometers of links in 400 cities. A continental network would open Africa up to herself as well as to the on-line world.

In addition to campaigning for and obtaining free internet access, the single best investment a university can make is to embrace innovation, experiment and possibility. Students are, Gage said, today’s innovators, the creators of tomorrow’s products (MIT Fablabs) and industries – they are the way forward. Their skills are there to be used, and their willingness to share and question their knowledge is also strong (Rice University Open source textbooks; ITESM-open university, Monterey, Mexico; Curniki; K-12, Gage’s own on-line surgery)

Under globalization, what universities need to foster is collaboration, internal and external, across computer-to-computer networks.

Gage also looked at some of the drivers of innovation. In addition to the unstoppable force of globalization, there are regional and local processes that drive improvements and advances in and from ICT, creating new business ideas and alternative business practices and thus alternative routes to personal financial stability at all levels of society.
As a thriving example, Gage gave some examples taken from the website Second life.com, which provides opportunities for students and non-students to log on and be directly involved in the creation of virtual worlds and for financial profit.

His parting thought was how could universities in Africa use the 2010 World Cup (to be held in South Africa) as a vehicle for ICT development?

**Bruno Kilunga Kubata**’s presentation was entitled *ICT and human capital development in Africa: The role of Centres of Excellence*. Focusing on biosciences in eastern and central Africa, he considered the following themes:

- Major challenges for Africa
- The Need for Research in Bioscience on the Continent
- African Experiences of NEPAD’s Initiative of Centres for Excellence in Bioscience.

Kubata began by showing the need for Africa to improve its food output per capita, which has been falling because of drought, human and agricultural disease, loss of biodiversity, and increasing competition from foreign markets.

BecA is, he said, a key route to food security. It provides opportunities for African scientists to use bio-science technology and make technological innovations to improve the livelihoods of resource-poor people in Africa.

Kubata discussed NEPAD’s BecA initiative in some detail, including its hub and Secretariat, current national and regional networks, and existing programmes and laboratories. He then listed its core competencies and demonstrated its real relevance to crop and livestock production across Africa.

To date, BecA – managed by Africans for Africans – has enabled the establishment of a state-of-the-art Bioinformatics facility, an upgraded server and computer training facility to complement the Bioinformatics platform, and established a throughput sequencing and genotyping facility. In addition, it has been responsible for a number of workshops and symposia and capacity-building exercises. It is also a way to increasing the number of quality scientific papers on Africa by Africans.

A new approach for growing and sustaining African human capital, BecA can add great value and complementarities to HEIs.

**Russel Jones** was last to speak during this session. His presentation was centred around WFEO and engineering capacity building in developing countries. In relation to fulfilling the following UN Millennium Development Goals, engineers have a key role to play:

- Ensuring environmental sustainability – reducing by half the proportion of people without sustainable access to safe drinking water
- Eradicating extreme poverty – reducing by half the number of people living on less than a dollar a day
- Developing a global partnership for development – in cooperation with the private sector, making available the benefits of new technologies, especially information and communications technologies.

‘Re-quoting’ Confucius’s lesson of the fish, Jones said that today it is important to not only provide the poor with the means to sustain themselves but to also show how they can develop and sell these means on to others, thus increasing capacity and fostering economic development. Simply providing food/aid on which to survive is not enough; as Easterly has pointed out, ‘all of these efforts over the past few decades have failed to lead to the desired
economic growth … these massive and expensive efforts have failed because they did not hit the fundamental human behavioral chord that “people respond to incentives”.

Jones then looked at two things that could work in place of this out-dated model, namely: i) the utilization of advanced technologies and ii) providing education that leads to high skills in technological areas, and then discussed what changes needed to be made, in terms of engineering, in order to put theory into practice. Essentially, this comes down to upgrading engineering education in Africa and updating curricula and learning approaches.

So doing will provide a solid base of technologically prepared people in developing countries that will:

- Attract investment from multinational companies
- Assist in making the most of foreign aid funds,
- Address infrastructure needs
- Provide a basis for business development by local entrepreneurs.

Jones then briefly discussed two complementary approaches to the above before running through the various African initiatives and programmes run by the WFEO Committee on Capacity-building (CCB) and detailing its current partners in Africa. He then listed WFEO’s planned workshops and conferences for 2007, before ending his presentation with a reminder to the floor of the importance of the new Confucian model for aid and societal development to all developing economies.

Points of discussion:

**Hassan to Kubata:** With regard to BecA, the support of the Canadian government must be acknowledged – how does this affect your saying that it is run by Africans? And what about where your centres are located?

**Kubata:** Yes this is true, but the principles on which it operates are decided by Africans, in Africa. Other African governments are also putting in money; we are not reliant on external aid. Our centres are global but they are linked as national research institutions, they are only based at universities because these institutions meet our criteria for placement.

**Gage to Hassan on Kubata:** If no such measures are taken to open up R&D, whether at country, regional or even sub-regional level, Africa is going to further miss out. Hopefully this session will enable the creation of a formal alliance on advocacy and moving forward in this area…

**Question to Jones:** When it comes to teaching CAD and so on, how important is national vs regional accreditation?

**Jones:** It very much depends on the size of the critical mass, because of its size, Brazil is national, the Caribbean is regional. What we are looking at, at this stage, is an outcomes assessment, providing students with the ICT skills they will need in their working lives. We are looking at fostering a healthier learning process.

**Gage:** It is difficult for funders to find people who know how to spend money ‘properly’ and in a timely way. Money is coming in from new sources – China and India. Accreditation is important, but it must function as a shorthand for assessing who does what, how, where and with what results.

In America, an accreditation exercise for schools left 9000 out of 100,000 on probation in terms of the quality of the teaching and learning they provide. Rating such schools is not hard,
working out how to improve them is. The difficulties would essentially be the same if this had been done in Africa. It is not about setting standards so much as changing outcomes.
Session 7: Forging New ICT-Enabled Partnerships for Education and Applications

7.1 Connectivity and Management Options

Chair: Professor Livingstone S. Luboobi, Vice Chancellor of Makerere University

Panelists:
Peter Bateman, former Manager, ODeL Initiative, African Virtual University
Kristin Peterson, Co-Founder and Chair, Inveneo
Duncan Martin, CEO, TENET

The speakers reviewed several examples of ICT-enabled partnerships for education and applications. This session looked at some of the barriers to effective partnerships and how they can be overcome. It also discussed what sorts of partnerships have the highest potential for African universities to increase their role in ICT-led economic growth.

Peter Bateman’s presentation focused on bandwidth connectivity and management. Through a series of succinct slides, he pointed out why it was essential for Africa – African universities more particularly – to have access to first-world bandwidth capacities and thus be able to enjoy, benefit from and contribute to the outcomes of global connectivity. In Bateman’s opinion, this is essential for communication, research, course and content delivery and access to educational resources.

However, for this to take place, a certain number of challenges must be overcome, namely:

- Currently unreliable and expensive connectivity
- Poor management of limited connectivity
- Lack of (aligned) university policies for managing limited bandwidth effectively
- Africa’s few satellite ‘footprints’
- The currently limited fibre access
- The huge costs
- The lack of dedicated connectivity.
- Lack of regulation about connection charges
- The differing models of ownership.

Bateman explained why Africa pays so much to ‘talk’ to the rest of the world, listed possible solutions and schemes and discussed some of the various initiatives undertaken to address issues around bandwidth. The latter included the ATICS initiative, the PHEA’s work with the African Virtual University (AVU), the role of Géant and the AVU’s independent research into achieving better connectivity for the continent.

He then discussed the merits of the different routes to global connectivity for Africa, citing VSAT as the most viable, but listing its inherent difficulties, and the need to achieve full transponder loading, which could be met through better regional networking. Despite some of the implicit difficulties – regulatory restrictions, for example – what is essential is that African universities draw up and adhere to clear and sustainable business plans and bandwidth management policies and practices. Key words and phrases here were leadership accountability and strategic direction. Above all, there is the need to form a bandwidth consortium.

Bateman pointed out that the above cannot be facilitated in a hostile policy environment – policies on the use of bandwidth must be consultative, supported and led from the top.
Kristin Peterson of Inveneo showed how her company has successfully taken tailor-made ICT to rural communities in West and East Africa in order to foster economic development.

Beginning by paraphrasing Bill Clinton, Peterson pointed out that intelligence and motivation are distributed equally around the world, but access to opportunity is not… This is where Inveneo, a not-for-profit social enterprise, has a key role to play. Its mission statement is ‘to empower people and organizations in rural, under-served communities by providing access to affordable, functional and sustainable tools of Information and Communications Technologies (ICT)’, which include computing, networking – Wired/Wireless (Wi-Fi) networking, internet access, telephony and the use of Open Source software.

Founded in September 2004, Inveneo now provides specialized solutions in 6 countries (Uganda, Rwanda, Ghana, Mali, Guinea Bissau, the Philippines) for 16 organizations, 56 communities and more than 53,000 people. The impact? Significant change and improvements to local education and agriculture, local economies, relief-provision, entrepreneurship, e-government and microfinance. As an example, Peterson used Inveneo’s involvement in an Action Aid village empowerment programme in rural Uganda which has enabled farmers access to information on production techniques, market prices, small office functions and thus the ability to form and manage local cooperatives.

It has achieved this by embracing the principles of low-cost, sustainability and local-ownership. More specifically its products are low-power, extra-durable and tolerant of harsh operating conditions, easily-used, supported and affordable.

In addition, Inveneo partners with local ICT experts, thus building skills in the region and creating routes to revenue generation for local partners and local economies.

Peterson then turned to the issue of opportunities for African universities to drive ICT for economic development. Besides stepping up ICT Education and applications development, universities must work at influencing policies and regulations around ICT and its use in Africa. They could also partner with organizations operating in rural areas for ideas exchange and resource sharing, implement mentoring/application-sharing with smaller organizations, and work at harnessing the growing interest of its private sector.

Duncan Martin looked at issues around Internet connectivity and collaboration, first giving the floor a potted history of the evolution of the internet from US Department of Defense research project through to its current place in global everyday thinking and use. He then moved on to a study of some of the market factors involved in global and continental connectivity as well as how such connectivity is brought about.

His next sub-topic was the (dis)advantages of VSAT over fibre for Africa and how the latter will, eventually, become the route for Africa and African universities keeping ‘in touch’ with the rest of the world. The current routings and the deployment of SAT-3/WASC/SAFE and EASSy were highlighted.

Martin then turned to the recent changes in academic networking; that from the mid 1990s student computing has become the norm and that researchers’ bandwidth needs have grown exponentially. Globally, academies’ response to this situation (and its requirements) has been to set up much-needed RENs – Research and Education Networks that use standard Internet engineering protocols to provide links and routes between connecting sites.
Existing RENs in Eastern and Southern Africa are: KENET (Kenya); MALICO/MAREN (Malawi) and TENET (South Africa). NRENs under formation are MoRENet (Mozambique); RWEDNET (Rwanda); TENET (Tanzania); RENU (Uganda); and ZAMREN (Zambia). NREN projects are also starting up in Botswana, DRC, Ghana, Namibia, Nigeria, Senegal, Somalia, Sudan, and Zimbabwe. The UbuntuNet Alliance, a fledgling regional REN, is looking to build the ‘Géant of Africa’. Registered as a non-profit association in Amsterdam, it has the full legal capacity to operate world-wide. These organizations need the active support of their users, Martin emphasized.

Obviously, the ultimate goal is for all RENs and NRENs to be inter-connected, thus producing a single, global REN, for Africa, the benefits would be obvious. It would also mean that such universities would, through better networking and connectivity, be able to access publishers’ and other suppliers’ sites, facilitate high-speed general web browsing, allow external access to their own e-learning and other web resources.

Currently, the WSIS 2008 goal for RENs in sub-Saharan Africa is that, ‘universities and research institutions in Southern Africa will have access to broadband services and the global Internet on the same level as peers in the developed parts of the world, with a quality of service in the Gbps rather than Kbps and with delays, variations and error rates as defined by normal properties of properly run terrestrial fibre networks.’ (Professor Bjorn Pehrson, AAU Conference, WSIS-Tunis, Nov 2005).

Moving on, Martin discussed various ownership models for NRENs and key factors affecting the outcomes and efficacy of collaborative structures.
7.2: Social Networking Options

Chair: Shehu Usman Abdullahi, Vice-Chancellor of Ahmadu Bello University, Nigeria

Panelists:
Stuart Gannes, Director, Digital Vision Program, Stanford University
Samir Anand, Operations and Development Manager, Cell-Life Research Project, University of Cape Town
Fernando de Sousa, Regional General Manager, Middle East and Africa, Microsoft Corporation

The speakers reviewed several examples of ICT-enabled partnerships for education and applications. This session looked at some of the barriers to effective partnerships and how they can be overcome. It also discussed what sorts of partnerships have the highest potential for African universities to increase their role in ICT-led economic growth.

Stuart Gannes looked at innovation using extant technology and how it can and is being used by and for an emerging class of entrepreneurs and aspirants in the developing world. By limiting communication problems through new interfaces, applications, cost-structures and (research) partnerships, portable ICT devices can provide almost limitless opportunities for low-income earners and/or those living in communities with more traditional infrastructure problems. In addition, micro-finance has made loans affordable to the entrepreneurial poor and ICT allows them the tools they need to run their small businesses. The needs and power of these very people should not be ignored; they represent a very significant portion of technology’s current 4.5 billion customers.

There is also the new and powerful class of social entrepreneurs, i.e., people dedicated to promoting the growth of equitable civil societies who pioneer innovative, effective, sustainable approaches to meet the needs of the marginalised, the disadvantaged and the disenfranchised. “Today, rather than linking minds and markets, they are looking at using minds and IT to fight social problems and indeed see many of the Millennium Development Goals as a set of IT objectivities”, Gannes said. Moreover, they recognize that the best people to solve these problems are often those affected, they understand their situation most clearly and simply need to be given the means to sustainable, practicable and relevant ends.

Gannes then spoke about Stanford’s Digital Vision programme, which sees itself as a ‘do’ tank rather than a ‘think’ tank. Its runs DV seminars and workshops and establishes interdisciplinary collaborations in order to design and implement new programs, whose solutions are based on real needs, further community development, are innovative and sustainable. Moreover, they and their programs are ‘failure tolerant’, accepting the need for mistakes as a valuable part of the learning process. So doing is made easier given the university’s proximity to Silicon Valley, a centre that has long been comfortable with the necessity and inevitability of technological and other types of ‘failure’. Indeed, it actively seeks out partnerships with the private sector in Silicon Valley.

Before outlining some of the programmes prototypes that have since become successful and impactful ventures (Jo’s toolkit, BracNet, PlanetRead), Gannes summarized the core foci of the nine-month DV programme, namely:
- Defining needs
- Prototyping services
- Creating partnerships
- Creating cost-effective innovations
- Creating cost-effective ventures
- Creating cost-effective visibility.

Gannes ended his presentation with a slide showing the global reach of DV alumni and a summary of DV’s achievements in the period 2005-2006.

**Samir Anand** spoke about Cell-Life, a South African ICT-enabled partnership, where he works that addresses particular aspects of public HIV/AIDS healthcare, specifically the management and monitoring of individuals’ ARV regimens via technological innovation – in this instance an alternate use of cellphone programming and data-relay capabilities. Originally a UCT-based academic project, Cell-Life is now strongly in the public domain. Ensuring that it is a collaboration between UCT, the Cape Peninsula University of Technology and several corporates have been and is key to its not-for-profit sustainability.

Now employing 15+ people, including engineers and computer scientists, its target ‘market’ is ART sites/clinics (B2B) (B2C). For example, Cell-Life’s iDART (Pharmacy Management System) is currently being used by the Desmond Tutu HIV centre (WC); Gugulethu Community Clinic (WC); Masipumele Community Clinic (WC); Taung Hospital (NW); and Hillbrow Clinic – RHPU (GT). Its Aftercare programme is currently in use by Sizophila Project Gugulethu (WC); AED Version (MP, KZN, EC); and the Taung and Koster Clinics (NW). To date the total number of people whose anti-retroviral treatment is being monitored as a result of Cell-Life’s ongoing R&D is 10,000.

The value of its R&D has been recognized by South Africa’s Technology Top 100 – it has achieved first place for the past two years. Why? Cell-Life has come to terms with a number of issues surrounding technology and policy:

First, the organization has recognized that technology is not a magic solution; it is only an enabler. It can only be a means to an end if it is understood and easily applied by its end-users. The extant technology it uses is flexible; it has and can be adapted to serve new purposes. The Cell-Life team has also been able to manage and deal with failure as well as the ongoing demands to upscale.

Moreover, it has kept its running costs low, used OpenSource (sharing – OpenMRS, Ubuntu) software, where applicable, organized its IT operations through Service Contracts and offered different policies for different demographic contexts.

In terms of the future, Anand cited the following seven areas as critical:

- Continuing and fostering links with various academic institutions:
- Pursuing opportunity in emerging consumer markets
- Expanding its number of ART site implementations
- Supporting government’s ARV roll-out campaign
- Enlarging its partnerships and collaborations
- Extending the use of ICT to provide other cost-effective healthcare solutions
- Maintaining a strong and active focus on academic research and implementation.
Finally, Anand expressed the hope that the amount of red tape that his organization (and others like it) has to cut through will soon be reduced. In the case of Cell-Life, time is not only money, it is life itself.

**Fernando de Sousa** brought the session to a close with a conversation on ICT as an enabler, with particular reference to higher education and Microsoft’s roles in this regard.

First he looked at Microsoft’s ICT-related socio-economic impact, namely:

- Corporate social responsibility programmes
- Microsoft as a grant-making body
- Its thousands of partnerships
- Its activities in bridging the digital divide.
- Projects developing IT usage in primary and secondary schools.

This is all very well and good, he said, but the challenge is for higher education to be seen as such a driving force and for both their and Microsoft’s future efforts to meet Russel Jones’ Confucian model of community empowerment. It is not enough to simply provide a set of skills, they must be focused on enabling economic growth. De Sousa pointed out that the rate of unemployment in Africa has risen over the last ten years, despite a decade of international aid. What does this tell us? That the aid being given is not having any knock-on effect.

To this end, Microsoft’s chairman’s goal is to reach out to Africa’s youth and its entrepreneurs and show them how they can use technology to drive business and build economic opportunities. Above all, the key phrase is the provision of functionality. It is not, he said, about the spread of code, Windows software or Office. Equally important is the fostering of partnerships and networking, the creation of valid links between businesses, higher education and individuals.

The above can only be achieved if government gets rid of all the red tape surrounding connectivity and ICT. Costs and inefficiency of ICT use and application must also be reduced. This is another area where higher education can act as a healer. Vice-Chancellors must look at how their institutions can add value to society by becoming centres of and for the communities they serve, the social relevance of universities will increase and with it their powers of leverage upon government. Universities in Africa should look at becoming the custodians of continental ICT implementation. By becoming such centres of excellence, they will draw in private investment and so become less dependent on government funding.

De Sousa brought his conversation to a close by highlighting four key points. Firstly, higher education does have huge potential to create partnerships to lobby for change in ICT access, but only if it is seen to:

- Focus on people
- Be actively building human capital
- Be mobilizing and driving society through technology.

Secondly, technology is only an enabler of growth and development. Africa must become a producer not just a consumer of ICT.

Thirdly, capacity and sustainability in ICT must be built, and not just in urban areas. Rural areas are equally important.

Lastly, universities and other centres for higher education must not be discouraged by the amount that needs to be done – they can move forward if the commitment is there.
Points of discussion:

Comment to Duncan Martin: VCs and most institutions are willing to develop their networks. The problem is taking the first steps to so doing.

Anamuah-Mensah, on bandwidth: given this afternoon’s presentations, it is all the more vital that VCs develop a strategy and start lobbying.

Martin: Ghana is also setting up a REN.

Del Alamo: On the cost of cabling, who is pocketing the difference in costs between North-South and South-North connections?

Martin to del Alamo: Not the NREN. Telkom do give us good prices, but they are operating as a business and their profits are enormous. The SAT3 cable is owned by a private ‘club’; it is hard to know how much money they make.

Luhanga to Petersen: What is the cost of setting up in a remote area? How to ensure that locally-trained personnel don’t leave for urban areas in the hope of making better money?

Mugenda to Petersen: How are you funded? How do you choose your locations?

Petersen to Mugenda and Luhanga: We charge for the hardware that is used or made for them. It runs on OpenSource software and we look for NGOs to provide support and development. In terms of sustainability, we try to keep the costs as low as possible and work with funders and develop business plans for our clients. We ourselves are self-funded.

The costs obviously vary depending on what needs to be installed, but per computer it tends to work out at about US$500. The rural village equipment featured in the presentation cost roughly US$2000, including the solar panel.

Projects tend to find us! Our focus at the moment is on East and West Africa.

To Anand: For clarification, how do you access patients? Do you advertise?

Anand: No, they are ‘found’ via the treatment sites and through home-based caregivers. Cell-Life never meets any patients face-to-face and only ever contacts particular patients using a bulk SMS.

Luhanga, referring to Jones, to Anand: you expressed the importance of generating money, etc. through sound business principles – in this way you are exporting fish not just fishing for them!
Session 8: Policy Issues: Intellectual Property, Cost, and Regulatory Implications of the Expanding use of Information Technology in Universities and in their Work with Government or the Private Sector

Chair: Professor Loyiso Nongxa, Vice Chancellor of University of Witwatersrand

Panelists:
Lishan Adam, Independent Research Consultant
Eric Osiakwan Exec. Sec., African ISPA
Eve Gray, International Policy Fellow, Open Society Institute, Budapest

Rapidly developing technologies increase demands for training and information, and often force policy changes affecting new technology users and providers. Creating a favorable policy environment for deploying ICTs involves issues of regulation (e.g. liberalization, privatization, competition policy) intellectual property rights, universal service and rural connectivity, affordable and competitive pricing, and regulation on IP connectivity. This session explored the policy implications of expanding use of ICTs by universities, the university role as communicator of evidence to inform or influence policy, and curricula that will prepare students to become effective policymakers.

Lishan Adam addressed the floor and stated that he hoped his concise presentation would consolidate the last two days’ talks. For him, there are three areas where African universities have a clear role vis-à-vis influencing government attitude to connectivity and internet access in and for higher education.

These are:

1. Influencing policies on access at all levels – campus networks, NRENs and RENs, as well as advanced infrastructure for scientists and researchers.
2. Research and development in policies and regulation, i.e. the university being a ‘communicator of evidence to inform or influence policy’.
3. Training and education in ICT policies and regulation.

As Adam sees it, few campus networks are well-designed and learners (and staff) need to be able to integrate seamlessly, both internally and externally. RENs and NRENs can and do influence connectivity, for they bring forth national and regional intellectual and economic capacity, thus university bandwidth must be nationally agreed upon and adhered to. If fibre is available, it must become available to universities, in order to give Africa a common and/or single voice. Regulatory frameworks must also become more standardized, and universities must lobby for easy inter- and intra-access.

In his presentation, Adam also revisited issues of connectivity costs, national broadband strategies, challenges to satellite connectivity, the World Bank’s 2006 African Development Report on regulatory quality as well as the diverse opportunities for RENs and NRENs explored in the previous seven sessions.

The important thing for universities to do, Adam reiterated, is to think locally, regionally and internationally.

Eve Gray introduced her theme – how universities can take better advantage of their published materials and thus raise their academic and social profiles – by commenting on the
fact that ICT policy as regards electronic publishing and IP has been neither researched nor discussed. This is odd, she said, as publishers have to be strategists in order to survive. 

Africa is, she said, in transition from the ‘bookless’ to the ‘silent’ continent. It is not promoting its own development of its own knowledge. Moreover, the academic ratings system works against Africa; the criteria and journals of the global North are dominant and thus determine ranking and intellectual positioning. 

A scholarly publisher, Gray’s own credo is that there is a fundamental need to develop policies and strategies that could grow the output and effective dissemination of Africa-based research in and from Africa, for African development, and in the most appropriate media and formats. In other words, Africa must abandon the Northern ideal of hard copy publishing, which is both expensive and subject to geo-political constraints and tariffs, in order to:

1. Liberate African knowledge.
2. Take its knowledge and disseminate it as widely as possible in order to get its impact up and so bolster effective research and economic development.
3. Fully enter the modern era of academic publishing. (According to statistics, Africa produced only 0.2% of all online academic content in 2002 – the situation has not yet improved. South Africa’s percentage of articles in Thompson Scientific indexed journals is but 0.5%.)

So doing would be very strategic, as it would enable government to:

1. See a return on its investment in research.
2. Evaluate a university’s contribution to development.
3. Evaluate a university’s research effectiveness.

Effective publishing for national needs could build Africa’s research profile. Indeed, Africa has its own model for success in this area – the HSRC. An Open Access Internet publication that can also provide printed products at subsidized prices and publishes everything from research reports and discussion papers through to conference proceedings and data sets. The result? It is now responsible for more than 200 online publications and has become the ‘first stop’ for policy-makers, politicians and researchers. Its international reach has also enhanced the degree of prestige for itself and for its published authors. On-line scholarly publishing can work and must be made to work for Africa.

**Erik Osiakwan**, the last speaker at the conference discussed an alternative idea for ICT development at universities in Africa as a process of empowerment – the use of Open Access, QUAD, BPO and horizontal layering. Quipping that all that he had to say had indeed already been said by others, he ran through his presentation succinctly, drawing attention to those facts and areas whose importance to VCs needed to be re-emphasized.

First of all he examined the nature of Open Access. In the US it largely concerns capacity-unbundling, particularly in terms of roll-out-to private homes, while in Europe it is used to address wider issues around network access, operation and financing. In the context of Open Communication, it essentially means that anyone ‘on equal conditions with a transparent relation between cost and pricing’ can access and share communication resources in order to provide value-added services.

Further, he said, it transforms the communications system and its markets from vertical to horizontal competitiveness. Instead of needing a small number of large organisations, Open
Access has brought forth ‘extremely diverse ‘ecosystems’ with a mixture of small, medium and large organizations whose operative standards are:

- Anyone can play
- Technological neutrality
- Fair and non-discriminatory competition at all layers
- Transparency to ensure fair trading within and between layers
- Everyone can connect to everyone else at the layer interface
- Devolved rather than centralized solutions.

In this regard the use of Open Access levels the economic playing field. Herein lies a huge opportunity for Africa to move forward, but only if i) it is prepared to collaborate and ii) its governments come to see the provision of modern telecoms as a basic service, as are roads and water.

For universities in Africa, Open Access supports the development of technology parks and Business Process Outsourcing (BPO) and thus the route to new types of sustainable income- and skills-generation and with it, greater social and economic relevance to the nation. Again, adequate telecoms provision is key; as Osiakwan pointed out interaction among these businesses in a common environment is an essential element for collaboration in innovation and business growth.

A second and more elaborate option for African universities is QUAD BPO, where they provide the land, legal framework for access, and the human capital ‘needed to stock the boutique’ while the leasing BPO/Tech park companies (with or without their own constituents) bring in the financial capital. As a result, local players develop valuable specialist knowledge and the ability to sell it.

This is a highly-desirable win-win situation for all concerned:

- Universities need to provide students with practical knowledge and experience to make them ready for the knowledge economy and life
- BPO/Tech parks need students as cheap but quality labour, and in large supply
- Universities can use this access to practical and industrial knowledge in the classroom
- BPO/Tech park CEOs and managers are able to prepare students for their firms
- BPO/Tech park companies need R&D –universities provide that on a practical basis using their work and student pool
- Government needs constant input from academia, the private sector and NGOs into public policy. This would be readily available through the above interactions
- NGOs need knowledge of private practice and public policy to ensure grassroots engagement; this would be available through the above interactions.

Points of discussion:

Desai to Osiakwan: There must be telecoms taxation for the use of internet networks, no matter where you are. Such networks are a nation’s backbone.

Gannes to Osiakwan: What is the cost, per person, of bringing fibre to Africa?

Osiakwan to Gannes: To connect Africa, fibre costs are approximately US$1 per person (Adam said between US$4-6). We should be able to find that money internally. Much fibre and other infrastructure already exist.
Dugga to Gray: Having journals online is a way to make universities open and available. However, this involves a level of editorial competency as regards what goes up on the web … what about language?

Neerja Raman to Gray: Won’t it be difficult to regulate quality as the size of electronic content grows? Are there any ways to leapfrog this?

Gray: Yes, what goes through the pipe is important, thus we need to create a rationale on intra-African publishing on the internet. These kinds of issues are the very problems I am investigating. We need to develop blogging, increasing the numbers of publications in order to get the information out there. Greater in-continent publishing and information dissemination will improve quality of content and screening, and increase the amount of true peer-reviewing. At the moment, Africa is not being reviewed by Africans. If you need examples for success in this area then look at HSRC, Romeo, PILOS 1.

Gage, on the publishing and the language issue. Look at Wikipedia ranking by language. The highest ranking in Africa is Swahili at 102. English comes in at 1.2 million! However, writing in your own language can easily up the rankings and thus up the ante about African language. There could be a beginning for African publishing, especially for scientific knowledge.

Some to Gage: I have Googled Swahili usage. It is amazing to see how many people use and read Kiswahili outside of Kenya (DRC, Burundi, etc.). Raising the profile of Swahili would be very useful.

Gray, on sustainability and university presses: University presses must be kept open, books are essential and expected. However, we must look beyond books: we must think web for sustainability.

Materu to Gray: I agree that there does need to be a global move towards accepting internet publishing, especially in terms of issues around tenure and promotion.

Materu to Adam: NRENs are a good idea with lots of benefits. Do you have any costing for the two you mentioned? What are you looking at, investment-wise?

Adam: NREN costs? Ask Duncan Martin for the figures! The key costs are structures, but even these are small. Connectivity is the issue; resources come from universities.

Martin on TENET: A bandwidth consortium keeps the costs down, as do organizational collaborations. TENET now only adds 7% to Telkom’s charges (it used to be 14%) to cover its overheads and finance investment. We hope to lower this still further.

Dugga to Osiakwan: Investors have no reason to go to odd university locations. Why would BPOs choose out-of-the-way locations?

Materu to Osiakwan: We live in a political economy of doing things we want to do. How can we make academic staff agents for QUAD BPO initiatives?

Osiakwan: Locale doesn’t matter, it is the quality of the intellect and the speed of connectivity available that are deciding factors.

Additional comments:

Nigeria may not have an NREN but it does have an ICT forum that is in the process of forming one.
Tagoe: Ghana established its own NREN last week. Lack of West African knowledge about itself is a problem, as is the Francophone/Anglophone language divide. Perhaps we can have a regional meeting on this subject?

Osiakwan: Yes, we must engage on this.

Tagoe: BPO/Science Parks are a good idea but there are many problems for VCs in terms of legal founding instruments. We need to see how these can be changed. It is essential that all university land has educational ‘content’. We have leased 100 acres for a private science park but have a contract in place that stipulates the university’s options for involvement. Incidentally, Ghana’s new Minister of Communication and his deputy are both lecturers at the University of Ghana!

Some to Osiakwan, on outsourcing: Moi has 10 acres available for a science park with a caveat and a MoU of providing knowledge-based business. While it’s not exactly Open Source it is an example of how much university infrastructure can be outsourced. The reluctance to do so must be overcome.

Osiakwan: BPO is not such a radical idea. Moreover if you all start doing it, the laws will have to change.
**Session 9: Roundtable on How Universities Might Explore Innovations in ICT for Development and Poverty Alleviation**

**Chair: Akilagpa Sawyerr, Secretary-General, Association of African Universities**

*During this last session, attending Vice Chancellors (VCs) explored specific ideas for possible new programmes and initiatives*

Akilagpa Sawyerr, after commenting on the previous two days’ extensive rich discussion, invited the Vice Chancellors to discuss how they see the way forward, how they will customize and implement what they have learned.

Matthew L. Luhanga: This workshop has shown a very wide range of possibilities for Africa despite its disparities/divides. First it is important to make detailed surveys of our institutions with regard to ICT. The AAU study on this is already out of date. We need to know where we are before we can move on. We need to establish any legal constraints, for example. It is vital to have a strategic plan that recognizes weaknesses as well as strengths, threats as well as opportunities.

We can learn from each other too, owing to the diversity of our institutions. For example, in setting up ICT at the University of Dar es Salaam (UDSM), we asked other Tanzanian universities with ICT in place for assistance. We shopped around for our connectivity in order to get our entire university online.

It is the role of VCs to lead this process, not to delegate it. VCs must also be model users of ICT themselves; that way they will be able to ‘convert’ their own institutions. Only then can you encourage the partnerships from the private sector, for example, as they see that you are working in the same way.

Sawyerr then commented on the number of special features of this workshop:

- The presence of the private sector
- Being able to address the role and collaborative potential of/with the private sector
- Presentations on innovation and experimentation with ICT.

All of which have reinforced the necessity that universities need to do better and work better with ‘outside elements’ in order to increase internally-generated productivity.

Adigun Agbaje: I am struck by the amount of work that needs to be done as well as that which has already been done. We need to;

- Build on what we have achieved so far in terms of infrastructure, community interventions
- Identify our areas of strength in ICT and use them as levers for progress
- Dialogue with government and develop the right contacts if every student is to have access to the internet
- Ensure that, as academics, our students do not leave us behind
- Prepare students for the world of online/external posts.

Jophus Anamuah-Mensah: This workshop opened up countless possibilities to him; the relevance of passing down knowledge so that teachers know to assist students in building skills they will need at university is now even more clear. Essentially, he said, this is matter of curriculum change: private and public schools must both prepare their senior school students for the virtual world. So doing will hugely boost university capacity and potential.
The Government of Ghana does recognize ICT as a pillar of, and for, development, thus he hopes that he will have some success in lobbying Ministers for the right infrastructure to liberate Ghana’s learners.

Sonni Gwanle Tyoden was struck by the contribution and role of donor agencies and countries in the establishment of ICT infrastructure. However, he asked, how long is going to be before the private sector and governments of African countries realize that it also their responsibility to make ICT a central issue.

Attracted by the degree of collaboration that exists, and also the potential for it, he also felt it was important to see how VCs can help each other to, for example, cut costs by avoiding duplication.

C. B. N. Tagoe: The Government of Ghana aimed to set up a proper ICT system six years ago. Now we require commitment to doing so, not just to the making of statements. He agreed on the necessity of having a strategic plan in place: his experience of this workshop has been to realize that things do happen when such plans are in place. Moreover, VCs need to believe in the potentiality/actuality of what has been talked about here.

Loyiso Nongxa: Was struck by the fact that the challenges of ICT are easy to state yet the areas for innovation are also great. The lack of creative thinking and/or problem-solving is as much an impediment to progress. Universities do want more freedom but haven’t gone about getting it, which is why ICT in Africa is lacking. Regionally the number of initiatives is good, and, continentally ICT is a priority but there as yet is no concrete information about how to or who should move forward.

Why is this? Because we are working in silence, we are perhaps reluctant to share our knowledge and experience.

From this meeting we should each identify 2-4 things to address over the next 12 months, and by whom, and then report back. The last thing he wants, he said, is to attend a meeting in a year’s time only to hear the exact same things being said. It is time to report on progress, not on inertia.

Sawyerr agreed here that it is crucial that everyone at this conference does at least one thing that will radically impact on their department, faculty, organization, and so on.

Michael O. Faborode: Expanding our assets at and as a university is crucial. We need action plans, we need to form partnerships to bring down costs, add leverage and provide our students with more and better opportunities. We also need to set benchmarks for future assessments of and on our progress.

Shehu Usman Abdullahi: I have learnt a lot from this meeting and have realized that it is possible to become an expert in ICT without undertaking vast amounts of ICT training. However, to make headway, we need to engage with the private sector. In relation to policy-making, VCs have a key role in determining the outcome of policy issues.

Njabulo Ndebele: It is a question of scale, of tackling numbers. Human talent in Africa is the most important thing: this is one of the reasons we are at this workshop, to work out ways of developing this vast pool of talent. However, we must be careful to balance our scale of thinking with the scale of need. We need to upscale in this area, thinking of the continent as a unified whole in this regard, even though Africa is not a monolithic structure. Looking at the bigger picture will help us see the importance of ICT and how best to leverage things.

There is also a need for greater leadership from, and a strong and direct voice for, higher education. However, speaking with one voice will require considerable deregulation.
We also need to take our statements to government and make ministers realize just how important and vocal both universities and ICT are in terms of the national good.

**Sawyerr** then asked how VCs can impact on policy-making at all levels.

**Anamuah-Mensah**, commenting as a linguist: ICT is not purely a scientific thing, it is also used across a wide number of disciplines, including language learning (CALL). If we can all use ICT then we should. It may be naïve, but it strikes me that most of what we need to get going is really already in place. The three Rs and creative thinking are the way forward. Countries like Ghana and South Africa do have fibre in place yet still have no organizing plan. Where are we to start? When are we going to be ready?

**Uday B. Desai, to the panel of VCs**: What is the real strength of universities? Students. They are a fantastic resource, as is ICT, which is for young people, really… Thus we must exploit students as a force.

**From the floor**: You have not talked about the outputs of your investments/policies. I’ve not heard a great deal about the impact of the universities contribution. What do we want to contribute to national improvement?

**Neerja Raman**: Could each one of you write down what you are going to do, demonstrating your capacity for action, and share it privately amongst yourselves?

(It was pointed out at this juncture that next year’s AU conference (February) is an ideal opportunity to see what ICT developments have taken place or are going happen. In the meantime, we must make sure that costs are brought down, and participation is opened up.)

**Del Alamo**: You must also look beyond your own body of students – there are foreign students wanting to get involved in Africa and ICT (cites MIT’s volunteer programme)

Sawyerr, in summary of the above, made the following points:

- Not to focus ICT only on science
- That Africa’s youth is very important
- The importance of universities not taking their intrinsic value for granted
- To make use of hidden resources.

**David K. Some**: Agrees that a university’s power does lie with its students, thus it is important to encourage students to make the most of it. It is important to avail them of computers, laptops, connectivity. He was excited about the entrepreneurial programmes discussed at the workshop, and feels that it is important that the pursuit of such knowledge becomes part of the curriculum. Africa must be a part of global ICT.

**Olive M. Mugenda**: We must learn from others, and look to government and beyond for support and assistance.

**Luhanga**: Collaboration must take place and on an equal footing. Smart targets are essential. So far sustainability has not been talked about. In relation to an initiative started at UDSM, one threat was the potential loss of talent through ‘poaching’. To counteract this, UDSM registered its ICT center as a limited liability, and privatized it. It still provides service to the university but also to the private sector and is able to pay its staff members more highly, thus avoiding the ‘brain drain’.

**Luboobi**: The word ‘speed’ was mentioned frequently, in relation to how fast we as universities move. In this regard, it is important that we keep our ICT facilities up to date if we are to attract students.
Don Baridam: In addition to students, a university’s technical and academic staff is also important. They must also be computer literate. Currently, some academics don’t even know how to post exam results!

On collaboration: Is there any collaboration between software developers and computer technicians within universities? We need to address issues relating to internal collaboration before we should be looking at external collaborations.

Sawyerr wrapped up this session by stating although it was clear that everyone at the conference was excited about what they had heard and discussed, they now have to reflect upon it and decide how to act. What is clear is that VCs need to:

- Critically interrogate their university
- Start strategic planning for ICT development rather than trying to ape what others have done
- Look at sustainability – the public dimension, operating low-cost bandwidth with public sector help, making ICT a standard facility, like the supply of water and maintenance of roads, forming groupings to lobby at higher levels, using resources as best as possible
- Address the importance of defining outcomes that will justify external investment.
- Create information-sharing platforms similar to this one at UCT
- Look at follow-up nationally, regionally and continentally.
- Develop collective support
- Engage with all levels of policy-makers.