

# Challenges Posed by Information and Communication Technologies (ICT) for South African Higher Education Institutions

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## Abstract

Information and Communication Technologies (ICT) are the major driving forces of globalised and knowledge-based societies of a new world era. They will have a profound impact on teaching and learning for two decades to come. The revolutionary change which is taking place in Information and Communication Technologies (ICTs), has dramatic effects on the way universities carry out their functions of teaching, learning and research, particularly on the creation, dissemination and application of knowledge. These developments pose unprecedented challenges to higher education institutions (HEIs) in developing countries particular in South Africa as South Africa is viewed as the leading country on the continent.

## Introduction

As South Africa becomes more of a knowledge-based society, there will be a greater demand for continuing and life-long education. With this development the need for even more flexible learning, available anywhere, anytime and on any topic will increase. On the Africa continent it is anticipated that higher education (HE) in the new millennium will be experience greater access for students, irrespective of age, sex, race or socio-economic status. Already delivery systems are more student/ learner centered and attempts are made to customised the curriculum and syllabi to the specific needs and conditions of learning, i.e. providing learning at the learner's own pace and level. The impact of technology use puts South African higher education institutions under pressure to provide learners with technological skills in order to adapt to all the challenges of a competitive economic environment. The shift from the Paper age to the Information age requires that the user-centered models replace provider-centered ones in which learners construct their own knowledge (Cronje & Clarke, 1999. p. 1).

Policies for South African higher education acknowledge the imperatives posed by ICT. So is the integration of Information and Communication Technology (ICT) in course content and delivery emphasised by The National Plan for Higher Education (April 2001). This document emphasises the role ICT can play in enhancing students' mobility, delivering information and to provide broader access to

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knowledge. However, South African higher education institutions still have a long way to make optimal use of ICT in the learning process. Although some institutions have made progress in this regard, there are a number of institutions and academics for which the new knowledge based era has not yet dawned. The purpose of this article is then to depict ICT, its evolution, identify reasons why it is currently one, if not the most

important area focused on and the basis for assessing the application of ICTs in HEI. It is hoped that through this paper higher education institutions can be guided to develop programmes with effective integration and utilisation of ICTs in their multidimensional functions and stimulate academics to explore the opportunities by ICT much more. Lastly, the authors provide guidelines on how to compile an institutional ICT profile to determine the readiness and maturity of an institution to apply ICT. The application of the suggested maturity tool will assist HEIs to develop a ICT profile as well as the important ICT policy document, the strategic directive of ICT implementation of an institution.

## Defining Information and Communication Technology

The terms IT and ICT are often confused and used incorrectly. What are the differences then? Information Technology is originally a technology of “storing and retrieving knowledge or data – i.e., on computers”. Whereas, communication technology (CT) is a technology of both/either ‘as a process [or transmission], by which A sends a message [voice and/or data] to B upon whom it has an effect’ and/or ‘as a negotiation and exchange of meaning’, which is widely known or separately evolved as broadcasting or mass communications and telecommunications. The very critical technology to realise such a convergence is the advent of Internet (i.e., internetworks), which enables to transmit, record, store, retrieve knowledge, data, images (e.g., broadcasting) and even voice (e.g., telecommunication), particularly worldwide on an instant or real-time base as two-way communications for both a one-to-one and one-to-multiple (Kim, 2002, p. 1). According to Rijsenbrij (1997, p. 2), ICT can be seen as the technologies that support the communication and co-operation of “human beings and their organizations” and the “creation and exchange of knowledge”. The Association of African Universities (2000, p. 3) defines ICT as “a shorthand for the computers, software, networks, satellite links and related systems that allow people to access, analyse, create, exchange and use data, information and knowledge in ways that, until recently, were almost unimaginable. It refers to the infrastructure that brings people together in different places and time zones, with multimedia tools for data, information, and knowledge management in order to expand the range of human capabilities” (Heeks, 1999, p. 3). In a nutshell, it involves the electronic means of capturing, processing, storing and communicating information.

## The Evolution of Information and Communication Technology

As illustrated in Table 1, computers, mass communications, and telecommunications have evolved separately and differently over the decades with changing technical, economic and regulatory environments in most countries. It is, however, rather difficult to generalise the trends and patterns of ICT development in various countries. In particular, the technological evolution or innovations such as fibre-optical cables, satellites, broadband, IMT 2000, Internet Protocol (IP) telephony and connectivity lead countries to converge the relevant administrations and legislation as well as adopt technology-neutral policy and regulation (Kim, 2002, p. 2).

Evolution over decades		COMPUTER	MASS COMMUNICATION	TELECOMMUNICATIONS
<b>TECHNOLOGY</b>	<b>Pre</b>	Data; Massive-size; Long-life span	Radio (Audio); Analogue; Limited channels	Telex (data) Fixed; copper cables
	<b>Post</b>	Data, image, voice; Personalised; Faster and shorter life span	TV (Audio-visual); Digital (HDTV); Unlimited multi-channels (e.g., CATV)	Telephone (voice); Fixed and wireless; Fibre optical cable etc.

<b>REGULATORY</b>	<b>Pre</b>	Market-led competition; No regulation	Public-oriented regulation (e.g., censor, contents, channel etc.)	State-owned or monopoly; Regulation
	<b>Post</b>	Emerging demands for regulation to ensure security and confidence	More towards monitoring to protect public interest	Public or private owned; De-regulation with more detailed regulatory frameworks
<b>ADMINISTRATION Ministry and Regulators</b>	<b>Pre</b>	Ministry (e.g., Commerce or Industry); or None	Ministry (e.g., Culture, Public Relations); or Regulators (e.g., FCC)	Ministry (e.g., Communications), PTT; or Regulator (e.g., FCC)
	<b>Post</b>	Ministry (e.g., MIT, MIC, MII etc.); or Regulators (e.g., ITBB etc.)	Ministry (Ditto); or Regulators (e.g., FCC, ITC, KBC, ITBB etc.)	Ministry (e.g., MOC, MIC); or Regulators (e.g., FCC, OFTA, OFTEL etc.)
<b>POLICY</b>	<b>Pre</b>	Not particular	Right to communication	Not particular
	<b>Post</b>	IT Policy	Broadcasting Policy	Telecom Policy
<b>LEGISLATION</b>	<b>Pre</b>	None or under the common commerce laws	Broadcasting Act	Telecommunication Act
	<b>Post</b>	IT Act	Regular revision of RA	Regular revision of TA to reflect new technology, services and competition

**Table 1. Different evolutionary paths of ICT over the decades.** Source: (Kim, 2002, p. 1)

Table 1 summarizes the past to present in the ICT area of development and highlights how the technology, regulations, administration, policies and legislation have evolved from past to present. The table also underlines the importance of an ICT policy in relation to the new ECTA 25 of 2002, known as the Electronic Communications and Transactions Act and which was signed on 31 July 2002 by the State President Mr. Mbeki and also published in the Government Gazette 23708 of 2nd of August 2002. This Act was signed at an elaborate ceremony, using a smart card, password and thumbprint to apply a digital signature. The ICT policy of any institution or company has to take the important issues of validity of electronic contracts, legal validity of electronic data, admissibility of electronic evidence, legal status of electronic signatures and personal information and privacy protection which are covered by the Act into consideration (ECTA, 2002, p. 34). It would be rather irresponsible for any higher education institution not to consider the importance of an ICT policy by applying the maturity tool and using all the possibilities offered by ICT.

## The Importance of Enhancing ICT on the Continent of Africa

The global information technology has been called “the world’s largest machine” (Ajayi, 2002, p. 3), complex and difficult to visualise and understand in its different hardware and software subsystems. Some of the remarkable and exceptional characteristics according to Ajayi (2000, p. 17) are the following:

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1. ICT has developed more quickly (measured in terms of price/performance ratio and others) than any other technology in the world (Jensen 2002, p.1). However, the picture in Africa does not portray rapid expansions. According to him of the 770 million people in Africa:
  - 1 in 13 has a TV (50m);
  - 1 in 40 has a fixed line (20m);
  - 1 in 40 has a GSM line (20m);
  - 1 in 130 has a PC (5.9m);
  - 1 in 150 uses the Internet (5.5m);
  - 1 in 400 has pay-TV (2m);
  - Internet traffic doubles every 100 days;
  - The number of dialup Internet subscribers is currently over 1.3 million, up from about 1 million at the end of 2000.
2. ICT provides learning mobility and will do so much more in future. There is the tendency for the mobile telephone to transform into the Internet client of the future, which is here to stay and expand. The vision for the future is the “mobile information society”, where the mobile phone will be the core device (Jensen, 2002, p.2). Obviously, the move toward a global knowledge society requires a fundamental shift in thinking about the methodology of education. ICT has already begun to exert a massive transformation of education systems in developed countries. Distance education universities are now quoted on the stock exchange, the best lecturers in the world are becoming available anywhere at the click of a button, while ‘Lifelong Just-In-Time Learning’ has become the order of the day. Failure to change and respond to these will have dire consequences 10-15 years from now for Africa’s education and learning systems (Aduwifa, 2001, p.30).

South African higher education institutions have no other choice but to participate in this information society. Otherwise, they will not be able to be competitive in the global higher education arena and to produce students and a workforce who can play their rightful role in the region and on the continent. Access to information and awareness of the possibilities of the effective use of ICT form part of this initiative.

### ***Priorities for the Implementation of Information Communication and Telecommunications in Higher Education Institutions***

In a case study research project Ajayi (2002, p. 15) found that almost all African universities have some form of ICT set-up, ranging from dial-up to full Internet connectivity with various bandwidths. The case studies presented are those that were readily available. There are both success and failure stories of ICT in HEIs in Africa. The case studies, however, have provided the premise to map out strategic plans for the development of ICT in HEIs in Africa. Four foundations, namely the Carnegie Corporation of New York, the Ford Foundation, MacArthur Foundation and the Rockefeller Foundation, have announced a HEI initiative of \$100 million for Africa, which will include ICT. For South Africa in particular, the following have emerged as priorities for the implementation of ICT:

- Formulation of strategic policies, plans and strategies for implementation as the availability of such documents can attract external international funding;
- Identifying of local champions and committed staff;

- Prioritisation of ICT for funding and declaring ICT a priority project in the University. ICT should be recognised as a utility, such as water and electricity, in the development of the university;
- Human Resources development (HRD) for sustainability;
- Organisational, structural and financial sustainability;
- Integration of technology into the new learning and research paradigm whilst staff and students are trained for this new academic environment;
- Coordination of donor support for cost effectiveness and economies of scale;
- Development of a campus-wide area network with fibre-optic cable backbone and /or wireless radio techniques. This will be an inter-connection of the various Local Area Networks (LANs) in the university;
- Use of digital PABX for expansion of local connectivity within the campus;
- Establishment of an Information Communication Technology Unit for ICT provision and development, with a Consultancy Unit for income generation, which can help in supplementing the staff salary to reduce or prevent brain-drain.

## Assessment of HEI's Needs for the Use and Applications of ICT

This is an aspect that should be well managed especially in the strategic planning for any ICT project or policy. The needs assessment has to take the following into consideration: teaching, research, administration and management, curricula development, library and archival services, the integration of technology into the learning and research processes and the transformation of the university into the modern education paradigm offered by the ICT and its pervasive working environment of the students after graduation. The process should take into consideration and reconcile between the "NEED" and the "WANT" of the HEI for the ICT. The usual actors in the assessment of needs in ICT are the academics, the senior administrators, top management, donor agents, local champions and leaders, innovators, etc.

A needs assessment is strongly bottom-up, although a well-designed and managed approach can greatly increase the quality of the outcome. There is a need to look at how ICT would help HEI to deliver education for an affordable price. The application of wireless Internet technology to African higher education also needs investigation. This is a cost-effective technology with a minimum time required for installation. It is important to drive as many departments and universities as possible to use ICT for teaching, dissemination of the technology in university services, and provide leadership in transfer and adaptation of ICTs to the larger African society. This can be achieved through the empowerment of change agents, financing them and the innovations they create and to recognise their value and leadership with praise and public recognition (Ajayi 2002, p. 23).

Two basic questions, however, should be addressed about the ICT needs of HEI in any ICT policy document. The first is: **Who should define the ICT needs of the institution?** Adebifa (2001, p. 13) proposes two scenarios that are applicable when determining institutional needs:

### Scenario 1: Players/Actors driven

- A full and coherent picture of the ICT needs can be obtained in an ideal case when almost all the players or actors are involved;
- A well-designed and managed approach can greatly increase the outcome of the exercise;

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- The lecturers, researchers, students, administrators, ICT technical team, the library and academic and administrative senior managers would constitute the relevant internal audiences;
- An external audience may also be taken into consideration in order to serve a larger community;
- This will be a natural approach followed by HEIs with a high level of ICT maturity.

## Scenario 2: The champion's approach

- The few champions or leaders, really interested and willing to invest time and energy are the main actors;
- This approach is more advantageous with a balanced output if the champion is part of the senior management;
- Care must be taken to ensure that it is in the long-term interest of the institution as a whole;
- This is usually the case for relatively low ICT maturity institutions;
- Quality of needs assessment is crucial for this class of institutions;
- If the ICT development starts with Scenario 2, it is necessary at a stage for Scenario 1 to be applied in order for the institution to take optimal advantage of the facilities and potentials of ICT;
- In order to promote innovation, there is a need for a “self organising” process to complement assessments;
- This scenario recognises successful innovations, rewards the innovators to stimulate more innovation and replicates the successes.

The second question considers **the level** at which ICT needs should be defined.

It is necessary to realise that the old “ivory tower” concept of the university has given way to the “market type-information age” university concept, which is open to the outside world and open internally. The following factors should also be taken into consideration: the demands for relevance and accountability, increased competition, new learning needs as well as realising the ICT contributions to realising an institution's overall strategy: The following aspects need careful consideration:

- It is necessary to define HEI's higher-level needs first and then identify how ICT can make valuable contributions;
- Consideration should be given to how far should the bottom-up process with ICT champions in the lead continue, and at what moment should HEI's management take over to make sure that initiatives are integrated and coordinated in the best interest of the institution as a whole;
- The role of donors can be harmful when they support sectoral ICT interest over institutional interests, and bordering institution in the long run with ICT maintenance, replacement, and staffing costs;
- The setting of priorities is inevitable, because resources in terms of staff and fund are scarce and must be optimally utilised;
- ICT can also be regarded as not just a tool, but a new paradigm to transform the whole society, including HEI;
- In whatever direction HEIs will change, they will always need access to ICT;
- The minimum requirement for any HEI therefore is access to Internet, a university-wide network, and ICT applications in teaching professional skills and research.

In order to meet above requirements and to account for the implications of ICT it can be helpful to develop a current ICT profile of the HEI. This is developed to define the applicable objectives for integrating ICT in teaching, learning and research, academic information services, and administration and management, and to plan for ICT resources accordingly. This profile will therefore indicate the maturity level of the institution to integrate ICT in the particular higher education institution.

### ***Determine the Higher Education Institution's Maturity for Information Communication Technology***

At a conference of Rectors, Vice Chancellors and Presidents of African Universities held in Arusha, Tanzania in February 1999, the Association of African Universities (AAU) was mandated to undertake a survey and assessment of the ICT capacities of African universities with the objective of synthesising the knowledge base of how African universities are using ICT to improve their teaching methods, enhance learning, strengthen research functions and manage library and other academic information services.

The Carnegie Corporation funded the study. A Working Group of Experts (WGE) of some thirty selected African and international scholars and donor representatives was established. John Daly, an independent consultant, was commissioned to synthesise the knowledge base of global trends of ICT applications in academic settings, with case studies of experiences and best practices. A three-week on-line-discussion was carried out by the WGE in April 2000. The report of the on-line-discussion by the WGE was presented at the meeting of the WGE held in May 2000 at the University of Dar Es Salaam, Tanzania. The following key issues for consideration were identified by this report (AAU, 2000, p. 3):

- An assessment of the present state of ICT in higher education institutions on the one hand and the future needs, on the other hand, in order to give an indication of the existing gap and also point at some critical issues;
- Adequacy of the ICT infrastructure to address the training needs of students to use the available ICTs in the Africa workplace after graduation;
- Curricula development to ensure that all graduates are ICT literate;
- Appropriateness of ICTs to achieve the functions and goals highlighted in Section 6.1 above and in particular to increase the efficiency of education delivery and adequate response to the new learning paradigm;
- Adequacy of the ICT for research and development in the light of globalisation;
- Provision of Internet facilities to the community and being in the forefront of ICT development in the country;
- Steps to be taken to ensure that HEI could perform the roles expected of them in ICT innovations. Necessity for institutional ICT policy, plans and strategies for implementation;
- Identification and development of ICT models that can be utilised from the experiences gathered from the case studies;
- Curricula development for optimal utilisation of African academics and possible credit transfer for on-line courses.

The following uses of ICT in HEIs were also indicated and which can be addressed in the development of any ICT policy or profile (AAU, 2000, p. 5):

- i. Support of HEI's core process of teaching and learning:
  - (a) Provision of contents;

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- (b) A professional tool in preparation for the future labour market;
  - (c) Support teaching methodology;
  - (d) Support management and monitoring of the teaching & learning process.
- ii. Support of HEI's core process of research:
- (a) To collect, exchange, and disseminate academic information;
  - (b) In support of conduct of research;
  - (c) In support of management of research projects;
- iii. In support of HEIs' core process of academic information services: Transformation of the library from the traditional book-oriented approach to outward looking with emphasis on information handling (not only cataloguing information) but in fact collection, processing, compiling, and disseminating it in support of students and researchers, inside and outside the institution.
- iv. Support of administration and operational management;
- v. Support of tactical and strategic management;
- vi. The ICT technical infrastructure; and
- vii. The ICT organisational infrastructure.

For this purpose the AAU's (AAU, 2000, p. 6) developed an ICT Maturity Tool. This ICT maturity tool is a guide, not a definitive measure, of an HEI's effectiveness in planning for ICT resources and in integrating ICT in teaching, learning and research; academic information services; and administration and management. The purpose of this tool, amongst others, is to:

- set benchmarks and goals - HEIs can use this tool to identify their current ICT profile and set goals for the future as part of their strategic planning; institutions can use it to determine funding priorities and to determine where funds are needed to fill gaps;
- apply for grants and fundraising purposes when applying for technology related grants;
- create assessment tools - HEIs can use the assessment of ICT maturity tool as a basis for constructing their own institutional technology assessments.

### ***Applying the Maturity Tool***

The tool suggests looking at the following nine (9) sets of variables and five (5) stages of ICT development. Depending on the variable, an institution may fall within a wide range of ICT development. Such mixed results are to be expected since this tool is intended to be a guide (AAU, 2000, p. 4).

#### **a. ICT variables**

1. Planning and Monitoring tools: availability of university strategic plan, derived information policy plan, derived information master plan, and derived information project plans.
2. Application of ICT in teaching and learning: teaching objective for using ICT, professional development of academic (teaching) staff, technology access and usage patterns of academic staff, and technology access and usage patterns of students.
3. Application of ICT in research: research objective of academic staff and students for using ICT.
4. Application of ICT in academic information services (Library): extent of access to online public access catalogue, services in academic information management, and training in academic information management.



5. Application of ICT in administration and management: extent of ICT application for administration and management.
6. ICT infrastructure: type of infrastructure as well as accessibility and usage patterns.
7. ICT organizational (support) infrastructure: staff responsibilities in technical as well as functional areas.
8. ICT financing: funding for ICT internally and via fundraising; with distinction within budget votes or budget line items.
9. Training, Research and Development in ICT: training for ICT human resources development (workforce and leaders).

## b. Stages of technology development

1. Entry stage: HEIs teach students to use the technology
2. Adoption stage: HEIs use technology to support traditional instruction
3. Adaptation stage: HEIs use technology to enrich curriculum
4. Appropriation stage: HEIs integrate technology and use it for its unique capabilities
5. Invention stage: HEIs are prepared to develop entirely new learning environments that use technology as a flexible tool; learning becomes collaborative, interactive, and customised.

The following suggestions for strategies and actions for HEI on their ICT profiles are provided to HEI in South Africa/Africa, which they can use as a guideline in setting up and applying their ICT profile effectively (Table 2):

	Strategy	Actions to be taken by HEI
1	To encourage and assist HEI's to formulate sound ICT policies and sustainable strategies for their implementation	Set up a working group (action team) of relevant experts on ICT in African HEIs; Analyse existing case studies of success stories and lessons learnt and disseminate analysis using appropriate technology (e.g. AAU Journal, newsletter, Web sites, email) to assist African HEIs take advantage of best practices; Survey existing practices and create a database of ICT with a view to: Design templates for action based on the categorisation of level of use of ICT and existing capacities; Establish realistic targets.
2	To encourage HEIs to identify or establish an ICT unit that operate at a strategic level within the administration of the institution	Prepare a set of guidelines to assist African HEIs in assessing their options with regard to establishment and placement of an ICT Unit
3	To advocate for a regulatory framework and suitable standards conducive to more effective use, growth and develop-	Analyse existing regulatory frameworks with respect to their impact on ICT in African HEIs; Make recommendations to African HEIs on

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	ment of ICT in HEIs	ways of achieving suitable regulatory frameworks; Lobby international and regional bodies for improved regulatory; Formulate Frameworks for conducive ICT in African HEIs.
4	To facilitate the creation of a network of ICT experts	Analyse available human resources with ICT experts (including subject matter); Build and maintain an online database and directory of experts ICT; Facilitate ICT staff exchange; Establish an e-forum to facilitate the sharing of ideas; Facilitate professional development activities in Africa; Disseminate information related to the use of ICT in HEIs in Africa.
5	To encourage HEIs to transform the practice of teaching and learning by bringing together best practices in education and in ICT	Disseminate information about courses that will help African HEIs to train faculty members to produce pedagogically sound online resources; Catalogue courses on ICT applications in teaching and learning; Negotiate prices on licensing fees for teaching and learning; Facilitate staff exchanges in teaching and learning Provide a source book on distance education.
6	To encourage HEIs to use ICT in research, including ICT as a topic of research	Disseminate information on the best uses of ICT for research; Facilitate provision of funds for research in ICT; Use ICT to prepare and maintain a research database; Create a peer-reviewed online journal on ICT in HEIs in Africa.
7	To encourage HEIs to use ICT in outreach and professional services	Provide information on how African HEIs use ICT to enhance outreach services, such as telecentres, school-level activities, television, radio, newspapers, etc.; Promote the provision and dissemination of information on best practices of ICT to support professional services.
8	To encourage HEIs to use ICT to improve their support ser-	Advise African HEIs on best practices related to core administrative functions;

	vices	Facilitate digitisation and development of inter-operable library services; Advise on the development of human resources capacity and organize regional training in ICT and support services.
9	To encourage HEIs to develop human resources capacities	Advise African HEIs on how to develop human resource capacity; Organise regional training in ICT and support services; Form an advisory working group to negotiate software licensing.
10	To Promote connectivity among HEIs in Africa	Develop connectivity standards for African HEIs; Encourage resource sharing among African HEIs; Encourage African HEIs to use connectivity to compete on the global higher education market place, for example through the formation of partnerships, networks, consortia, etc..

**Table 2: Strategies and Actions for HEI.** Source: Ajayi (2002, p. 5-13)

These strategies with their action plans are available to all HEI in South Africa and Africa to make use of and to become part of this initiative. “African universities have to run very fast to avoid falling very far behind” (Kim, 2002, p. 3). This is a good starting philosophy. The dynamic nature of ICT will be taken into consideration in setting time periods in view of the rapid development in the field.

### ***Short and Long Term Proposed Goals to Integrate ICT into HEI***

It is suggested to HEI that the time period and time frame for implementation of an ICT profile is either short-term or long-term. Short-term can be approximately a one-year duration, if possible six – twelve months and long-term can be approximately one to three years. Short-term goals must be designed so as to obtain results that can be felt in the institution in order to obtain local support and commitment to ICT’s development.

The dynamic nature of ICT and the rapid changes accompanying the ICT revolution calls for immediate action on the establishment of ICT facilities in HEI in Africa as a whole. It will be wise and useful for all the HEI in South Africa and in Africa to cooperate with the AAU in the Assessment exercise for the overall benefit of the development of ICT in Africa.

The survey should cover as many HEIs as possible with adequate regional representation in order to provide a good databank, which can be utilised by other international agencies interested in the development of ICT in HEIs in Africa. The HEIs should be classified according to levels of ICT maturity and development. Appropriate strategies should be worked out for each level.

## **Conclusion**

Various aspects of capacity building in ICT for higher education institutions in Africa were discussed. Consideration has been given to physical, institutional and human capacity building in ICT in African HEIs. These institutions must develop, use ICT and integrate it into teaching, learning as well as research and development. The HEIs in collaboration with the private sector must be the drivers of ICT

development. The digital divide and gap can only be transformed into digital opportunities if the emerging technologies are utilised by the HEIs to leapfrog into the modern information society. The facilities offered by ICT are tremendous in order to educate the teeming millions on the African continent, using technologies such as on-line courses, the African Virtual University (AVU) and other long distance educational facilities driven by ICT. A final consideration for all HEIs is that if they do not have Internet connectivity with reasonable speed (minimum of 64Kbps) and relevant ICT facilities in the next one-year they will not be in a position to fulfil the purposes for its establishment. The development of an ICT profile with an ICT policy document should be viewed by any HEI as the first step. The useful advise on using the maturity tool and applying the actions with a strategy (Table 2) is a starting point. HEIs in SA should all address an ICT policy and determine how their visions can incorporate the ICT profile and ICT policy to the benefit of the future of the institution and its stakeholders. It is therefore the time to act! As Charles Darwin profoundly indicated:

It is not the biggest, brightest, or the best that will survive, but those who adapt the quickest!

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## Biographies

**Prof ME HERSELMAN** is the Research Professor: Faculty of ICT at Technikon Pretoria. In this position she assists lecturers and post-graduate students with their research projects, NRF projects, articles and other research related activities. Since 1997 she has published several articles in various national and international journals and has presented papers at several international conferences. She has also been the team leader in a team research project in writing of a technical report funded by the NRF. Currently she has two NRF funded research projects and assists over 50 postgraduate students with their research projects. Her master's and doctoral students work on industry related projects especially focusing on ICT provision in disadvantaged communities in SA. Her field of expertise: All aspects of ICT in rural areas and HEI in South Africa.

**Prof HR Hay** is an Associate Professor and senior researcher at the Centre for Higher Education Studies and Development at the University of the Free State in Bloemfontein in South Africa. She is currently the Acting Director of this center and has successfully supervised 4 PhD's and 3 Master students in 2002. Her research projects related to: higher education policy studies, quality assurance, skills development in higher education, curriculum restructuring and development in higher education, transformation of higher education systems, research in higher education, etc. Succeeded in establishing a formal academic programme in higher education studies which today has more than 60 students – all on a post-graduate level.