Evolving Paradigms in the Networked World and their Implications for Information Management in African Libraries

Stephen M. Mutula

Department of Library and Information Studies,
University of Botswana,
Private Bag 0022,
Gaborone, Botswana
mutulasm@mopipi.ub.bw

Abstract

The networked world is characterised by the ubiquity and ever increasing application of Information and Communications Technologies (ICTs) in various sectors of an economy, including education, government, libraries, businesses, healthcare and homes. The networked world generates and moves large amounts of electronic information in the form of text, video, audio, graphics, and animations. A networked world affords opportunities for people, for example, to use e-mail for communication, use Web portals to access government information, access digital libraries from any point with a Web connection, and undertake formal and lifelong learning electronically. The evolving networked world has fuelled several paradigm shifts that are greatly impacting the way information and knowledge are created and managed. These paradigm shifts include information society, e-government, digital divide, and e-learning/digital scholarship. This paper provides an overview of the paradigm shifts sweeping the information landscape in the networked world and the implications for the creation and management of information, especially in African libraries.

Keywords

Networked world, information society, information management, digital divide, e-learning, digital scholarship, e-government, Africa

Introduction

The 'paradigm' concept originated with Thomas Kuhn in his book *The Structure of Scientific Revolutions*, where it is described as a set of beliefs, theories or world view that is unquestionably accepted and has become established as truth. According to Kuhn (1970), 'paradigm shift' is a change in the existing standard model, which creates transformation in the established truth (Kuhn, 1970). Bailey-Lloyd (2005) observes that a paradigm shift is when a significant change happens, usually from one fundamental view to a different view. In some cases, some type of major discontinuity occurs as well. Increasingly now, the paradigm shift concept is being used to connote revolution, emerging trend or change in pattern or transformation in the way humans perceive events, people, environment and life. In the context of this paper, a paradigm shift is used to describe major changes in conventional practices with regard to information management.

The concept of 'networked world' unlike that of 'paradigm shift' was originated during the latter part of 1990's by the Computer Systems Policy Project (CSPP) a public policy advocacy group in the United States, to refer to the Internet world, which is characterised by the prevalence and integration of ICTs in all sectors of a nation's economy (Bridges.org, 2001; Computer Systems Policy Projects, 2000). Such networked world is characterised by adequate and reliable physical ICT infrastructure; integration of ICTs throughout

businesses, communities, schools and government; pervasive availability and access to high-speed, quality and affordable network bandwidth; enabling national ICT policies; national and global commitment to universal access; and ubiquitous use of ICT in everyday life.

In a networked world, large amounts of e-content are being generated but the methods of managing such content remain inadequate. Besides, the networked world goes beyond the Internet and links people to people, people to business, people to information, and people to culture (The American Library Association, 2003). Such networked world encompasses traditional telecommunications and computing systems and employs new frameworks that move data, audio and video via increased bandwidth, wireless technologies and systems. In the unfolding networked world, libraries with the traditional responsibility of information management are increasingly called upon to perform roles related to generation, processing and dissemination of information in e-environments. The evolution of the networked world is both fuelling and being fuelled by paradigm shifts in the nature of the information-driven society (information society), governance (e-government), gaps between information 'haves' and 'have nots' (digital divide), increasing use of ICT for learning and research processes (e-learning and digital scholarship), and new technologies that are enhancing seamless connectivity (emerging technologies).

These paradigm shifts are inextricably intertwined and interrelated. The close relationship among these paradigms is reflected in the similarity of metrics with which all of them are measured, namely: PC penetration, number of Internet users, number of home Internet users, number of mobile Internet users, number of broadband households, number of wireless subscribers, secondary and tertiary education levels, civil liberties, and government corruption levels to mention but just a few (West, 2006; Economist Intelligence Unit, 2006; Martin, 1995). The World Summit on Information Society (WSIS) meetings held in Geneva, Switzerland and Tunis, Tunisia in 2003 and 2005 respectively were conceived to provide a framework that would harness the potential of ICT to realise the information society. WSIS was conceived against the backdrop of the widening gap between information "haves" and "have-nots" (digital divide), as well as the recognition of the increasingly important role of telecommunications in the political, economic, social and cultural sphere (WSIS, 2003), and also for the delivery of formal education and acquisition of lifelong learning (e-learning). On the other hand, e-government is emerging as one of the key strategies in the realisation of an information society because of its ability to provide expansive infrastructure through which citizens can gain access to information in the custody of government and other Web portals.

The importance of information management in a networked world is crucial and should start from the basic unit and building blocks of information which are data. Nicholas and Rowlands (2000) developed a model of the progression of information, knowledge and wisdom from data. Data occupies the basic level of the model and represents raw facts or observations upon which no meaningful decision can be made until these have been processed into information. According to the model, once data has been refined, it evolves into information, which ideally can be interpreted clearly, so that meaningful decisions can be made out of it. The third stage of the model is knowledge, which is a value-added derivative of information and according to Leonard and Sensiper (1998), is relevant and actionable. The final stage on the Nicholas-Rowlands model is wisdom, which implies the ability to perceive or determine what is good, true or sound. The focus of this article is on information and its management. Information management in organisations involves a number of different tasks, including creation and maintenance of meta information, searching for documents and other data objects, viewing and retrieving information (Information Management Consultants, 2003). From the perspectives of libraries, information management, especially in e-environments, may include subject indexing, cataloguing, classification and coding; database design and data structures; storage and retrieval of information resources; information audits and reviews; uploading of information into the system; and information extraction, publishing, distribution and access.

It is from the above perspectives that this paper provides an overview of the paradigm shifts sweeping the information landscape in the networked world and their implications for the creation and

management of information, especially in libraries in Africa

Evolving Paradigms in the Networked World

The networked world engenders several transformations in the way information is produced and managed. Information on the Internet is growing at phenomenal rate without adequate tools for bibliographic control, searching, filtering and retrieval. The search engines are inadequate tools as they do not adequately review the documents. Moreover, subject directories and gateways which make attempts to review documents only cover limited materials. Libraries are expected to develop tools that make it easier to organise and access information on the Internet. But the scientific journals that were a few years ago produced largely in print form are now rolled out, first, as e-versions before the print versions can appear. In addition, libraries are transforming their print collections into electronic formats through digitisation or subscription to e-journals with or without print alternatives as a strategy to make them more accessible and to enhance resource sharing. Concomitant with the transformation of what was previously largely a print environment into mega digital collections, several issues arise that must be addressed, such as integrity of the scholarly research process, intellectual property rights, privacy, security, etc.

The networked world has also occasioned transformation in the role of librarians. Stueart (2006) notes that in the new digital environment, the change in responsibilities of librarians is from intense effort to preserve one's own collections in one medium (print) to purveying information in multiple formats through virtual means. From the perspective of services, libraries are moving from being perceived as warehouses where materials are bought just in case they might be needed to a supermarket where emphasis is placed on access and just in time delivery. Similarly, the shift in the professional sphere relates to changes from the attitude of waiting for users to request for service, to staff having authority to promote technological and traditional links to current and potential users.

Additionally, the librarian's role now extends to include participating in the management and regulation of technological infrastructure, ensuring technological interoperability and open standards, promoting partnerships and collaboration among diverse communities, negotiating terms that reflect user protections under copyright law, developing and imparting information literacy, content development, Web design and more (Stueart, 2006).

In addition, there is increasing demand for librarians to vigorously select, catalogue and classify Internet resources to make them more accessible to users. OPACs are now being used as gateways to information within and outside libraries. The catalogue is no longer just an inventory or finding aid that used to be for what the library owns; but rather, it is now a portal to everything within and outside the library (Stueart, 2006). Likewise, publishers have also transformed to become not only suppliers but providers of information directly to the users. In addition, some journal publishers have terminated their print versions, and, now concentrate on Web accessible versions, making libraries' work more challenging. Moreover, publishers and database vendors are moving their information products to the Internet and targeting libraries as a significant market. Because these information resources can be accessed conveniently from any location with a Web connection, subscriptions to them have become increasingly popular, especially in research environments.

Furthermore, the library has, in the last decade, experienced increasing pressures to transform from placing emphasis on access to focusing on quality of information accessed. This is partly because information resources are being transformed into electronic formats or being born digital, and such electronic or digital formats are becoming more and more accessible outside than within the library. Secondly, the proliferation of e-resources on the Internet has created problems of how to identify and sift between information of high and low quality, and libraries are being called upon to provide intermediary functions in this respect.

Information Society Paradigm

Martin (1995) defined an information society as characterised by rapid growth and use of information, widespread exploitation of varied information sources, where people know and appreciate what information

they need, where to get it, how to get the information, and in the end, how to use it. Such a society realises the importance of information for all aspects of life, and is fully conversant with how to seek and use the information. Moreover, an information society caters for all, including children, by providing them with information in many formats and exposing them to the different technologies used for collecting, manipulating and disseminating the information. Furthermore, an information society is also one in which the quality of life and economic development depend largely on information and its exploitation.

The 2003 WSIS meeting in Geneva, Switzerland provided a clear vision of an information society when it declared a common desire and commitment of all the nations to build a people-centred, inclusive and development-oriented information society, where everyone can create, access, utilise and share information enabling individuals, communities and peoples to achieve their full potential in promoting their sustainable development and improving their quality of life…' Additionally, the 2005 WSIS in Tunis, Tunisia recognised cultural and linguistic diversity, identity, local content, and ethical dimensions as being critical for an inclusive information society (International Telecommunication Union, 2005). The International Federation of Library Association (IFLA) in the manifesto it submitted to WSIS underscored the importance of connecting villages and establishing community access points; connecting universities, colleges, secondary schools and primary schools; creating scientific and research centres; and providing public libraries, cultural centres, museums, post offices and archives with ICT (International Federation of Library Associations, 2003).

The information society is evolving in tandem with the networked world and sometimes the two phenomena, as pointed out earlier, are inextricably intertwined, especially from the perspective of the variables that are used to measure their ubiquity and pervasiveness (West, 2006; Economist Intelligence Unit, 2006; Martin, 1995). Since the turn of the 21st century, governments have been preoccupied with putting in place strategies on how to achieve an information society for all. One of the key catalysts in the attainment of an information society is the inclusive access to, and effective use of, ICTs by the entire populace of every country on the globe (Souter, 2007). The Information Society Index (ISI)

is used to examine how nations are positioning themselves to compete in the global information economy. The ISI is calculated based on 15 key data variables such as: IT spending as a percentage of GDP, software spending, IT services spending, PC penetration, Internet users, mobile Internet users, e-commerce spending, broadband households and wireless subscribers, secondary and tertiary education levels, civil liberties, and government corruption levels.

In 2006, of the 70 nations that were surveyed (International Data Corporation, 2007), most countries that were found to be leaders in information society index included South Korea (1st), Japan (2nd), Denmark (3rd), Iceland (4th), Hong Kong (5th), Sweden (6th), United Kingdom (7th), Norway (8th), Netherlands (9th) and Taiwan (10th). These countries were characterised by conditions necessary for high take-up of broadband connectivity, 3G mobile services, access to the Internet over mobile phones, and gains in infrastructure development. Africa featured poorly in this ranking. A similar IS index ranking of 53 countries worldwide in 2003 and 2004 placed South Africa and Egypt (the only countries from Africa) at position 34 and 46 respectively (International Data Corporation, 2004).

In a manifesto it submitted to the second WSIS in Tunis in 2005, the International Federation of Library Associations and Institutions (IFLA), implicitly highlighted the problems that developing countries, including Africa, must overcome in order to participate in the information society. IFLA underlined the following information readiness issues as pre-conditions for participating in an information society (Commonwealth Telecommunications Organisation, 2004; Berry, 2006):

- Providing affordable or free-of-charge access for their citizens to the Internet.
- Providing specific training programmes in the use of ICTs.
- Enabling national policies and laws to enhance content creation.
- Enabling appropriate, authentic, and timely content in languages people understand.
- Commitment of national government to connect all their public libraries to the Internet by 2006.
- Ensuring that intellectual property laws for electronic publications do not prevent public access.

- Public investment in information and telecommunication technologies.
- Enhancing intellectual freedom by providing access to information.
- Helping to safeguard democratic values and universal civil rights.
- Opposing any form of censorship.
- Building capacity by promoting information literacy, providing support and training for the effective use of information resources.

IFLA's manifesto to WSIS demonstrated that librarians are vitally involved with the creation of the information society and its consequences. The manifesto recognises that libraries and information services are essential to the roll out of the inclusive information society, with regard to safeguarding universal civil rights and intellectual freedom. Moreover, libraries and information services respond to the particular questions and needs of individuals, complementing the general transmission of knowledge by the mass media. Libraries and its supporting profession build capacity and provide support and training for effective use of digital and other information resources. Moreover, IFLA underlined the libraries role in helping to build capacity by promoting information literacy, providing support and training for the effective use of information resources (Berry, 2006).

The information readiness issues raised by IFLA at WSIS, especially those relating to training, content creation, ensuring intellectual property rights, promoting access to information, opposing any form of censorship, providing information access and enhancing intellectual freedom, all fall within the domain and jurisdictions of libraries. It is incumbent upon librarians to ensure these issues are addressed to enable the libraries they manage benefit from the networked world. Moreover, the role of librarians from the perspective of a networked world extends beyond the custodial roles for information and now includes: participating in information literacy; teaching in partnership with faculty; content creation and management; protecting the right of users to access varied resources; acting as intermediaries or facilitators; extending services to current and potential users; and selecting, cataloguing and classifying Internet resources.

E-Government Paradigm

E-government is emerging as one of the catalysts in the realisation of an information society or networked world because of its ability to provide expansive infrastructure, through which citizens can gain access to information in the custody of government and other Web portals. UNESCO-I (2004) defines e-government as the public sector's use of ICT with the aim of improving information and service delivery, encouraging citizen participation in the decision-making process, and making government more accountable, transparent and efficient. E-government is being perceived as a panacea to the deficiencies of the traditional form of government where citizens physically go to government offices to seek services, such as applying for passport, birth certificate, death certificate or filing tax returns (with the usually attendant delays, arising from long queues, lost files, or the absence of relevant officials).

The Digital Opportunity Index (DOI) can be used to measure and evaluate the opportunity, infrastructure and utilisation of ICTs by government and its people. DOI monitors recent technologies such as broadband and mobile Internet access, falling price of broadband, and increasing broadband speeds (World Information Society Report, 2006). The DOI ranking of Southern African Development Community (SADC) member states for 2004/5 in general showed that though great opportunities exist for most SADC member states to partake in e-government, little is being done in terms of taking advantage of such opportunities.

The E-government Readiness Index of 2005 showed that of the 191 member states of the UN surveyed, Europe follows North America in e-government leadership while South Asia, Central Asia and Africa are ranked last. The United Nations Report (United Nations, 2005) noted that despite the progress made in the last three years with regard to e-government implementation, a serious access-divide exists across the world between the developed and the developing countries. Of particular concern were countries belonging to the regions of Africa and South and Central Asia. These countries showed little relative progress in 2005 with respect to outreach and access to citizens. The Centre for Public Policy, Brown University, Rhode Island, in

2006, in a global e-government ranking of countries, found that sub-Saharan Africa member states performed dismally among 198 countries that were ranked. In this assessment, government Websites were evaluated for the presence of various features dealing with information availability, public access, online publications, online database, audio clips, video clips, number of different services, etc. The resulting e-government index ran along a scale from zero (having none of these features and no online services) to 100 (having all features). The top country in the ranking was South Korea at 60.3 percent. Other nations that scored highly were: Taiwan (49.8%), Singapore (47.5%), United States (47.4%), Canada (43.5%), Britain (42.6%), Ireland (41.9%), Germany (41.5%), Japan (41.5%) and Spain (40.6%) (West, 2006).

Most of the obstacles in e-government environments relate to poor organisation and management of content, which librarians can help address. E-government is, by and large, an information intensive environment that consists of decision support systems such as records management systems, integrated financial management systems, human resource management systems, communication systems, databases and portals. Information management in e-government therefore needs to be given priority. Citizens in an e-government environment expect that their rights are as well protected and documented as in a paper-based environment. Consequently, preserving the combination of content, context, and structure which give electronic records meaning over time to protect the fragile media from degradation and to ensure efficient access is of critical importance. Moreover, the purpose of e-government is the provision of information for citizens to hold their governments accountable; promote integrity in government and enable government to improve service delivery (International Records Management Trust, 2004). Information in e-government settings should therefore be effectively managed.

The importance of effective information management in e-government setting is evident. Schuppan (2007) points out that e-government in developing countries, including Africa, is still in infancy, going by paucity of content on government Web portals. Likewise the Ibrahim Index on African

Governance (Rotberg, 2007) reported the difficulties that were faced in collecting secondary data from government Websites saying 'not all African countries have Websites and where they do, they may not post useful data'. Heeks (2002) has noted that only about 25% of e-government projects are successful, while the rest fail. Most of the e-government projects failure may be attributed to inability to define any measures necessary for implementing information management good practices that are critical for success of such e-governments. Sawe (2005) observes that e-governments are expected to develop content of immediate local relevance, preserve national history or heritage and traditional knowledge. E-government systems through information management systems can effectively acquire, create, disseminate, integrate, maintain and exploit information for the benefit of citizens and other clients. Wimmer (2002) points out that e-government, through informatisation, supports information processes such as decision making, communication and decision implementation.

E-Learning and Digital Scholarship Paradigms

E-learning is the use of variety of information and communication technologies to facilitate student-oriented, active, open and life-long learning (University of Botswana, 2001). Education institutions, especially universities, are increasingly implementing various forms of e-learning to enhance classroom teaching and improve the quality of research (Department of Education and Youth Affairs, 2001). Through e-learning, group work, self-directed learning and maintenance of students electronic portfolios of their work (Livingstone, 2004) can well be managed.

Libraries are expected to transform, in order to cater for this emerging learning dispensation. In the academic sphere, digital scholarship is gaining currency. Marcum and George (2004), citing Kirsten Foot, refers to digital scholarship as "any element of knowledge or art that is created, produced, analysed, distributed, published, and/or displayed in a digital medium, for the purpose of research or teaching." Digital scholarship may include submission of articles, peer review and publication, all done electronically; teaching, using purely or blended electronic means;

evaluation and assessment of academic work electronically; collaborative research by electronic means; and electronic communications.

The Deputy Vice Chancellor of the University of Botswana, Prof. Frank Youngman, in opening up a digital scholarship conference at the University in December 2007, observed that the teaching and research work of academic institutions has been based historically on the printed page and that libraries, with their physical collections of books, journals and documents, have been at the heart of universities. He noted further that the academic environment in universities the world over is, however, undergoing tremendous transformation, as the shift takes place from print media such as books to the Internet and digital media including graphics, audio and video. Prof. Youngman continued:

'The rapid development of digital technologies, open courseware, open access publishing and the emergence of Web 2.0 are revolutionising scholarship, publishing, and the storing and preservation of information. A different kind of student is also emerging ("the iPod generation") with greater computer literacy and different kinds of expectations from the university experience. This transformation has been brought about by globalisation and the revolution in technology, especially the Internet and World Wide Web. The deployment of powerful computers, high-speed networks, and large scale storage technologies has made the academic landscape increasingly dynamic. The information environment epitomised by digital spaces, institutional repositories, new publishing models, digital libraries have, in the last decade, proliferated taking advantage of increased storage capacities, using different platforms such as DSpace, Fedora, Greenstone and ePrints. Similarly, collaborative spaces such as blogs, wikis, social networking sites, RSSs, mobile technologies have evolved in tandem, making it possible to integrate multimedia services in learning, teaching and research.' (Youngman, 2007)

Prof. Youngman's remarks capture, succinctly, the digital scholarship paradigm. Within universities and similar academic environments, increasingly now than before, there is a trend toward online delivery of information with libraries responding by making attempts to digitise materials that were once in print formats. This action is necessary so that the collections may be delivered to users 24/7 via intranets, the Internet, and other fast and emerging networks. Similarly, digital information resources are increasingly being relied upon as primary or complementary information sources of scholarship for teaching, research and administration purposes. However, in Africa, though universities are increasingly generating large amounts of research output, such output hardly reaches the international audiences because most of this content is stored offline.

Digital scholarship, in general, has the benefits of increasing visibility of universities on the Web and enhancing their competitiveness. It can also facilitate access to wide range of literature in electronic databases, digital libraries and institutional repositories of other universities, and consequently help address the dearth of information resources that universities in Africa are faced with. Through digital scholarship, it is possible for universities to:
- Enhance quality research.
- Enhance collaboration, sharing and dissemination of knowledge.
- Make contribution to global knowledge.
- Enhance content development.
- Help bridge the knowledge gap between the north and the south.
- Provide access for greater numbers of students to a well-supported and effective higher education.
- Make access to higher education more democratic and liberalised.

Implementation of e-learning and digital scholarship within academic environments will need to address a number of challenges. Mutula et al. (2006), in an empirical study of e-learning at the University of Botswana, asked respondents to identify problems that they faced in learning online. From the 86 respondents who answered this item, 35 (40.7%) identified shortage of computers, 22 (25.6%) decried the lack of clarity and difficulty of questions, 13 (15.1%) cited poor Internet connectivity, nine (10.5%) identified difficulty of locating information on the Internet, and four (4.7%) noted that they had difficulties coping with the workload. Finally, three (3.5%) had problems presenting information in

particular formats such as tables. Respondents further identified several learning content design issues including lack of clarity of questions, too many readings to cope with, lack of appeal of content, etc. On the question of how well materials were presented online, out of 86 respondents who answered this item, 70 (81.4%) said materials were usefully presented, 14 (16.3%) felt that materials were not well presented, while two respondents did not respond to the query. As to whether the online course was designed with their needs in mind, from the 86 respondents who answered this item, 58 (67.4%) said yes, 17 (19.8%) said no, and 11 (12.8%) did not know. Furthermore, Gerhan and Mutula (2005), in their study of bandwidths problems at the University of Botswana, found that shortage of computers is often cited at the university as one major factor hampering effective e-learning. In addition, students often complain of poor connectivity to the Internet. The University of Botswana is one of the most well resourced higher education institutions in Africa with regard to ICT; but given these infrastructure problems that it faces, the other African universities could be much worse off.

Libraries can play a leading role in e-learning and digital scholarship. To support e-learning and digital scholarship, libraries can develop mechanisms to perfect tools and procedures for enhancing easy access to e-information and e-content by creating portals, gateways, and hypertext links to resources. Libraries can also transform their print collections into electronic formats through digitisation or subscription to e-journals. Libraries should also transform their collection development policies to support e-learning and digital scholarship because scientific journals that were a few years ago produced largely in print form are now rolled out first as e-versions. E-learning and digital scholarship processes are supported by variety of content in the form of e-journals, e-books, institutional repositories, databases, and digital libraries. These resources must be availed by libraries, if they have to meet their obligations in the digital environment. There is also need for libraries to put in place relevant infrastructure to support the integration of various media such as text, graphics, animations, video and audio in teaching, learning and research processes. Libraries can be involved in behind-the-scene activities such as helping software designers to develop systems that fit in with users'

information-seeking behaviour. They can also take part in developing and delivering information literacy programmes.

The rising number of digital natives (a category to which most young students now belong), and digital immigrants (a category to which most experienced staff belong), oblige libraries to seriously develop interventions of policy and procedure so as to effectively address the needs of such groups of users. Libraries also need to develop resources such as institutional repositories to support e-leaning and digital scholarship. Institutional repositories contribute to the visibility and international standing of universities and research organisations, especially with regard to scholarly communications. Such repositories are also convenient for harnessing local content, which is necessary for building the knowledge society. For digital scholarship to thrive and become institutionalised in the universities in Africa, open access principles for increased benefits for individual scholars and facilitation of scholarly visibility of universities' research outputs on the Web should be pursued. Librarians and researchers are well positioned to champion open access initiatives within their institutions.

Digital Divide Paradigm

WSIS, as already stated, was conceived against the backdrop of the widening gap between information "haves" and "have-nots," as well as the recognition of the increasingly important role of telecommunications in the political, economic and social-cultural sphere (WSIS, 2003). The digital divide has often been perceived as the inequitable access to ICTs such as PCs, Internet, telephones, cable, and other Internet-related technologies by individuals or groups of people in a country or between countries (Spectar, 2000). Recent literature expands the dimension and scope of the digital divide into what is increasingly being referred to as 'new digital divide'.

The International Telecommunications Union (2003) observes that the so-called the "new" or the "quality" digital divide is not attributable to the lack of equipment or connections, but in its present form, the character of the phenomenon is changing from "basic to advanced communications and from quantity to quality". Warschauer (2002) observes that bridging the digital divide is much more than

providing Internet and computer connections, because access to ICT is embedded in a complex array of factors encompassing physical, digital, human and social relationships. Norris (2001) adds, "the digital divide is more than access to technology and there is need to look beyond the issue of access to technology." The "new digital divide" is also being attributed to the increasing use of new technologies by the youth (ipod generation or digital natives) compared to the elderly (digital immigrants) the world over. The youth use the Internet in all aspects of their life from researching new products to social interaction, compared to the elderly who are generally averse with technology. The new digital divide is also apparent in the level of usage of ICTs. Global Internet usage statistics shows that Africa, with 14.2% of world population, has only 2.9% of Internet usage, compared to Europe with 12.3% of world population and 37.2% usage (Internet World Statistics, 2007).

The new digital divide is evident in the implementation of intellectual property laws between the powerful capitalist west and the less powerful developing countries, including those in Africa. For example, conventional practice with regard to copyright law is that the duration of copyright is the life of the author and fifty years after his death. After 50 years, copyrighted materials move into the public domain and can be used freely without any charge (Kiggundu, 2007). The United States amended its law (Copyright Extension Act 1998) increasing the duration of copyright to 70 years (House and Senate, 1998), and now applies pressure on national governments, including those in Africa, to change their copyright laws to be in tandem with theirs (Kiggundu, 2007). This has implications in terms of the capacity of developing countries, especially those in Africa, to afford such copyrighted material for longer duration of time. At the same time, it gives the US leverage to allow its powerful multinational corporations to reap continuing profits at the expense of poor countries. Moreover, most of the content providers of digital material are domiciled in the developed world and insist, whenever they enter into negotiations with information providers in developing countries, on the inclusion in the contractual agreement clauses which override the traditional exceptions to copyright, such as fair use and fair dealing as contained in national legislations (Kiggundu, 2007). This makes it difficult for libraries

to freely avail information for academic use without breaching licensing agreements.

The digital divide in Africa is exacerbated by the high cost of digital information reflected in the high costs of access to external databases and the procurement of digital information. This makes it increasingly difficult for libraries in Africa to subscribe to new journals, books and also maintain existing subscriptions. Libraries, the world over, have well established traditions of archiving hard copies of all materials that they acquire, be they journals, books, newspapers or pamphlets. But increasingly, it is becoming more and more difficult in the digital era for libraries to continue with this long established practice, because content providers are insisting that once subscription ceases, access to entire database also ceases. Whereas such restrictions are not applicable to print resources, they are being imposed on electronic resources.

The digital divide is increasingly becoming a complex phenomenon to unpack. Crump and Mcllroy (2003) discussing a community-based project in Wellington, New Zealand wonder why when computing is available in a socially situated, convenient environment, at no cost, some people choose not to compute. Similarly, Lenhart et al. (2003), in a research project also in Wellington, New Zealand with economic as well as social inclusion objectives, noted that not all "have nots" necessarily want to be "haves" and neither do they view engagement in ICTs as a positive force that would transform the quality of their life. Similarly, in Northern Ireland (UK), free provision of computers, fast Internet access and a Website to residents/ business in the town of Ennis, in 1997 to enhance ICT uptake and modernise society were of limited use. Three years later, there was little to show because technology had been thrust into people's hands with little preparation. Training programs had been run, but they were not sufficiently accompanied by awareness programs as to why people should use the new technology in the first place.

In some regions of rural India, knowledge centres that were set up to provide information that is largely of local content nature such as market prices for crops, job listings, details of government welfare schemes and health advise, etc, have been reported as fuelling rural-rural digital divide. Some residents living in the centres' neighbourhood have

been reported not to know what the knowledge centres are all about. Likewise, in India, New Delhi's "Hole-in-the-Wall" project that was set up to provide computer access to the city's street children in one of the poorest slum, though well intentioned, did not achieve the desired outcome. The computers were connected to the Internet through dial-up access (Warschauer, 2002); however, Internet access was of little use since it seldom functioned. This was in part attributed to the fact that no special educational programs had been made available, and no special content was provided in Hindi, the only language the children knew. The project was perceived by some parents as a distraction of students from focusing on their school work. Similarly in Africa, telecentres were meant to enhance rural connectivity and help bridge the digital divide (Lenhart et al., 2003), but several years down the line, there is little to show in terms of bridging the rural-rural and rural-urban digital divide. These scenarios contrast with optimism of the 1990s that rural ICTs would leapfrog development, information societies and host of other electronic age applications for the excluded communities (Warschauer, 2002).

The access and use factors in digital divide equation need further research to be well understood. Green (2000), citing data from the Education Week (2000) teacher survey in the US, observed that when teachers were asked why they do not use software or the Internet for instruction, they reported the following reasons that have nothing to do with access:

- There is a lack of time to prepare and preview software or Websites.
- There is a lack of training on software.
- Too much time is needed to use technology.
- Technologies are not aligned with curriculum and assessment.
- It is difficult to find software to meet student needs.

The digital divide, especially in developing world, including Africa, is of global political and development concern. The United Nations 2005 Report (United Nations, 2005) observes that the spread of information technologies to a select group of people in the world was worsening the disparities between the e-haves and the e-have-nots, thus fuelling the danger that unequal diffusion of technology, far from fomenting cohesion by providing opportunity, would result in

reinforcing the traditional patterns of economic and social inequalities which could lead to the weakening of social bonds and cultural organisation. Kofi Annan, former Secretary-General of the United Nations, during the 2003 World Summit on Information Society (WSIS) in Geneva, lamented that for too many people in developing countries, especially in Africa, the gains of ICT remained out of reach. The International Telecommunication Union (2005) in its publication 'ICT Opportunity Index' in time for the second WSIS meeting in Tunis in 2005 reported that digital opportunities are unequally distributed between developed and developing countries and suggested that the gap between the ICT-poorest countries and most others is actually growing. The publication concluded that, literally, the 'have' and 'have-not' countries are worlds apart. Moreover, countries most affected were heavily concentrated in Africa. Similarly, the G7 group of countries in a conference on 'information society and development' in South Africa in May 1996 concluded that a large gap existed between industrialised and less industrialised countries in terms of information infrastructure. The gap was occasioned by far the less investment in ICT infrastructure by developing countries. In sub-Saharan Africa, only a few countries are better Internet-bandwidth-supplied. In 2002, only ten African nations had more than 5 Mbps and the 23 other Internet-connected countries had less. Moreover, Africa lacks a regional network; but rather, each country separately connects to the more expensive overseas circuits using satellites (Information Technology Services, 2004). The resultant bottom line effect is the inequitable access to information (Internet World Statistics, 2007).

The role of libraries in helping close the digital divide cannot be overstated. Bill Gates observed that 99% of benefits of having a PC come when you have provided reasonable … literacy to a person going to sit down and use it (The Economist Newspaper and The Economist Group, 2005). Libraries have the capacity and competencies to effectively undertake such literacy to enhance ICT usage. Libraries can also do more, for example, Albert Gore, former US Vice President in the Clinton administration, used the phrase 'digital divide' for the first time in 1996 and observed that '… as part of our empowerment zone initiatives we launched this cyber-Ed Truck, a book mobile for the digital age … it is rolling into

communities, connecting schools in our poorest neighbourhoods and paving over the digital divide' (Miranda, 2006). Mobile library services are ways public libraries have traditionally used to reach the marginalised in society who have no access to information. They can use the same model to extend mobile Internet services to areas not served with fixed line Internet connectivity

Moreover, within the networked world, information, especially on the Internet, is growing at phenomenal rate without adequate tools for bibliographic control, searching, filtering and retrieval. The search engines, as already pointed out, are inadequate tools, as they do not review the documents, subject directories and gateways, and only cover limited materials. Libraries can help by developing tools that make it easier to organise and access information on the Internet. Likewise, libraries could help in promoting the services of telecentres that were established in most parts of Africa to help bridge the digital divide through information literacy provision, repackaging of information to suit different tastes and developing content of immediate relevance to the people.

Conclusion

The networked world fired by the engines of ICTs has fundamentally brought new ways of creating knowledge, educating people and disseminating information, running government, speedy information delivery mechanisms, etc. A networked world links people to people, people to business, people to information, and people to culture. It encompasses traditional telecommunications and computing systems, and also employs new frameworks that move data, audio and video via increased bandwidth, wireless technologies and systems. The consequence of the networked world is generation of large amounts of e-information and the accompanying challenges in managing such e-information in all sectors of nation's economy.

The role of libraries in the networked world should be perceived in the context of the four paradigm shifts discussed in this article that currently define the global information environment, namely: information society, e-government digital divide, and e-learning/digital scholarship. These paradigm shifts demand libraries to put in place mechanisms to harness e-information to effectively partake in the networked world. Moreover, as the networked world continues to evolve, it is occasioning improvements in network speed, seamless integration, network intelligence and security that will enable those libraries that have connectivity to reap the benefits of digital age. Africa's libraries should consult with authors, publishers, and other stakeholders to work together to develop suitable business models for Africa that would address issues of restrictive copyright regimes for enhanced access to digital content. For Africa's libraries to succeed in positioning themselves to effectively participate in the evolving networked world, they must address challenges related to infrastructure, content organisation, digital literacy, none use of available ICT facilities, capacity building, etc. However, libraries can play their rightful role in the networked world, if governments can also play their part by providing adequate infrastructure and enacting enabling policies that promote open Internet access to stem the widening digital divide that hampers implementation and support of e-government, e-learning, and move towards information society by Africa's libraries.

References

American Library Association, (2003). Principles of the Networked World. [Online]. Available at http://www.ala.org/ala/washoff/washpubs/principles.pdf [Accessed 15 March 2008].

Bailey-Lloyd, C. (2005). What is a Paradigm Shift? [Online]. Available at: http://EzineArticles.com/?expert=CarolAnn_Bailey-Lloyd [Accessed 30 June 2008].

Berry, J.W. (2006). The World Summit on the Information Society (WSIS): A Global Challenge in the New Millennium, *Libri, 2006, vol. 56, 1–15.*

Bridges.org, (2001). Comparison of E-readiness Assessment Models: Final Draft. [Online]. Available at: http://www.bridges.org/eredainess/tools.html [Accessed 16 July 2003].

Commonwealth Telecommunications Organisation, (2004). Regional roundup: Libraries Help Bridge the Digital Divide, IFLA Submission to WSIS Process. [Online]. Available at: http://www.ictdevagenda.org/frame.php?dir=07

&sd=10&sid=1&id=441 [Accessed 22 July 2007].

Computer Systems Policy Projects, (2000). The CSPP Readiness Guide for Living in the Networked World. [Online]. Available at: http://www.cspp.org/projects/readiness/ [Accessed 12 August 2004].

Crump, B and Mcllroy, A. (2003). The Digital Divide: Why the Don't-Wants-Tos' Won't Compute: Lessons from a New Zealand ICT Project. Wellington: First Monday.

Department of Education and Youth Affairs, (2001). Information and Communication Technology for Teaching and Learning. [Online]. Available at: http://www.detya.gov.au/schools/publications/index.htm [Accessed 5 September 2004].

Economic Commission for Africa, (2005). The Status and Impacts of Development of National and Regional ICT Policies, Plans and Strategies. Fourth Meeting of the Committee on Development Information (CODI IV), Addis Ababa, Ethiopia 23 – 28 April 2005

Economist Intelligence Unit, (2006). Digital Divide Narrows. London. The Economist. [Online].Available at: http://www.ibm.com/news/be/en/2006/04/2601.html [Accessed 28 May 2007].

The Economist Newspaper and the Economist Group, (2005). Behind the Digital Divide. [Online]. Available at: http://www.economist.com/printedition/PrinterFriendly.cfm?Story_ID=3714058 [Accessed 10 April 2007].

Gerhan, D. and Mutula, S.M. (2005). Bandwidth Bottlenecks at the University of Botswana: Complications for Library, Campus, and National Development. Library Hi Tech 23 (1), 102-117.

Green, L. C. (2000). Bridging the Digital Divide in Our Schools –Achieving Technology Equity for All Students. Education Market Research. Education Week's 1999 National Survey of Teachers' Use of Digital Content. New York: Education Market Research.

Heeks, R. (2002). Information Systems and Developing Countries: Failure, Success, and Local Improvisations. *The Information Society*, 18(2), 101-112.

House and Senate, (1998). Copyright Extension Act. Tech Law Journal. [Online]. Available at: http://www.techlawjournal.com/courts/eldritch/pl105-298.htm [Accessed 12 September 2007].

Information Management Consultants, (2003). What is Information Management? [Online]. Available at: http://www.willpower.demon.co.uk/infoman.htm [Accessed 30 January 2004]

International Federation of Library Associations, (2003). Libraries the Information Society in Action: Address to Plenary World Summit on the Information Society, Given by Alex Byrne, President of IFLA, Tunis, 18 November. [Online]. Available at: http://www.ifla.org/III/wsis/Byrne-Plenary-Address.html [Accessed 14 February 2006].

International Records Management Trust, (2004). The E-records Readiness Tool. London. IRMT

International Telecommunication Union, (2003). World Summit on the Information Society. Geneva, 2003 Tunis 2005. [Online]. Available at: http://www.itu.int/wsis/docs/geneva/official/dop.html [Accessed 13 March 2007].

International Telecommunication Union, (2005). ITU and Orbicom Publish ICT Opportunity Index: A Step Towards the Implementation of the WSIS' Plan of Action. [Online]. Available at: http://www.itu.int/ITU-D/ict/publications/dd/summary.html [Accessed 17 April 2007].

International Data Corporation, (2004). Information Society Index: Middle East and Africa. [Online]. Available WWW: http://www.idc.com/groups/isi/main.html [Accessed 22 February 2006].

International Data Corporation, (2007). Information Society Index*:* An IDC Report Series. [Online]. Available at: http://www.idc.com/getdoc.jsp?containerId=IDC_P7066 [Accessed 12 February 2007].

Internet World Statistics, (2007). Internet Usage Statistics: World Internet Users and Population Stats. [Online]. Available at: http://www.internetworldstats.com/stats.htm [Accessed 12 September 2007].

Kiggundu, J. (2007). University Education and Intellectual Property in the Digital Era: Whither Botswana? Seminal Paper. Gaborone. University of Botswana, April 14 2007.

Kuhn, T.S. (1970). The Structure of Scientific Revolutions. 2nd ed. Chicago. The University of Chicago Press.

Lenhart, A., Horrigan, J., Rainie, L., Allen, K., Boyce, A., Madden, M. and O'Grady, E. (2003). The Ever–Shifting Internet Population: A New Look at Internet Access and the Digital Divide. [Online]. Available at: http://www. Pewinternet.org/ [Accessed 11 May 2003].

Leonard, D. and Sensiper, S. (1998). The Role of Tacit Knowledge in Group Innovation. California Management Review, 40(3), 112-32

Livingston, P. (2004). Laptops Unleashed: A Middle School Experience. *Learning and Leading with Technology*, 31(7), 12-15.

Marcum, D. and George, G. (2004). E-Scholarship: Is It Something Truly New and Different?" *Educause Review* 39 (1): 8-9.

Martin, J.W. (1995). *The Global Information Society*. Aldershot. Gower.

Miranda, A.D. (2006). Technological Determinism and Ideology: Questioning the 'Information' Society and the 'Digital Divide'. [Online]. Available at: http://www.ces.uc.pt/bss/documentos/2006_11_13_alvaro_de_miranda.pdf [Accessed 2 April 2007].

Mutula, S.M.; Kalusopa, T; Moahi, K and Wamukoya, J. (2006). Design and Implementation of an Online Information Literacy Module: Experience Of The Department Of Library And Information Studies, University of Botswana. *Online Information Review* 30 (2), 168-187.

Nicholas, D. and Rowlands, I. (2000). The Internet: its Impact and Evaluation. London: Aslib.

Norris, P. (2001). *Digital Divide: Civic Engagement, Information Poverty and the Internet Worldwide*. Cambridge: Cambridge University Press.

Rotberg, R. (2007). The Ibrahim Index on African Governance: How We Achieved Our Rankings. *African Business,* November 2007, No. 336, p. 20.

Sawe, D.J.A. (2005). Regional E-governance Programme: Progress from Tanzania, 2nd EAC Regional Consultative Workshop held in Nairobi, Grand Regency Hotel from 28-29 June 2005.

Schuppan, T. (2007). E-government in Developing Countries: Experiences from sub-Saharan Africa. [Online]. Available at: http://www.tcd.ie/Statistics/egpa2007/docs/Schuppan.pdf [Accessed 27 November 2007].

Souter, D. (2007). Whose Summit? Whose Information Society? Civil Society and WSIS. Paper presented at the Centre for the Study of Globalisation and Regionalisation 10th Anniversary: A Workshop on Digital Divide: A Legal Postscript to the World Summit on Information Society held at the University of Warwick, 17-19 September 2007.

Spectar, J. (2000). Bridging the Global Divide: Frameworks for Access and the World Wireless Web. North Carolina Journal of International Law and Commercial Regulation, 26, 57.

Stueart, R. (2006). Digital Libraries: The Future of Scholarly Communication. Paper presented at the University of Botswana in UB Library Auditorium, 10th -11th August 2006.

UNECO-I, (2004). E-governance. [Online]. Available at: http://portal.unesco.org/ci/en/ev.php-URL_ID=3038&URL_DO=DO_TOPIC&URL_SEC [Accessed 15 March 2005].

United Nations, (2005). Global E-government Readiness Report. [Online]. Available at: http://www.unpan.org/egovernment5.asp [Accessed 10 May 2007].

University of Botswana, (2001). University of Botswana eLearning. Gaborone. Ubel

Warschauer. M. (2002). Reconceptualising Digital Divide. [Online]. Available at: http://www.firstmonday.org/issues/issue7_7/warschauer/ [Accessed 1 September 2007].

West, D.M. (2006). Global E-government. [Online]. Available at: http://www.insidepolitics.org/egovt06int.pdf [Accessed 15 February 2007].

Wimmer, M. A. (ed.) (2002). Knowledge Management in E-government. Proceedings of the 3rd International Workshop (KMGov-2002) in Copenhagen (DK), 23-24 May, Schriftenreihe Informatik #7, Trauner Verlag, Linz

World Information Society Report, (2006). Digital Opportunity Index 2005. [Online]. Available at: http://www.itu.int/osg/spu/publications/worldinformationsociety/2006/World.pdf [Accessed 13 February 2007].

WSIS, (2003). World Summit on the Information Society: Draft Declaration of Principles. Geneva. [Online]. Available at: http://www.wsis-pct-org/prepcom2-declaration.html [Accessed on 7 November 2004].

Youngman, F. (2007). Opening Speech at the Digital Scholarship Conference held at the University of Botswana Library Auditorium, 12-13 December 2007.

* Prof. Stephen Mutula is Associate Professor in the Department of Library and Information Studies, University of Botswana. He is currently a visiting professor at the Department of Information Science, University of Zululand, South Africa. He holds PhD (Information Science), MLIB, PGD Com Science, and B.Ed.